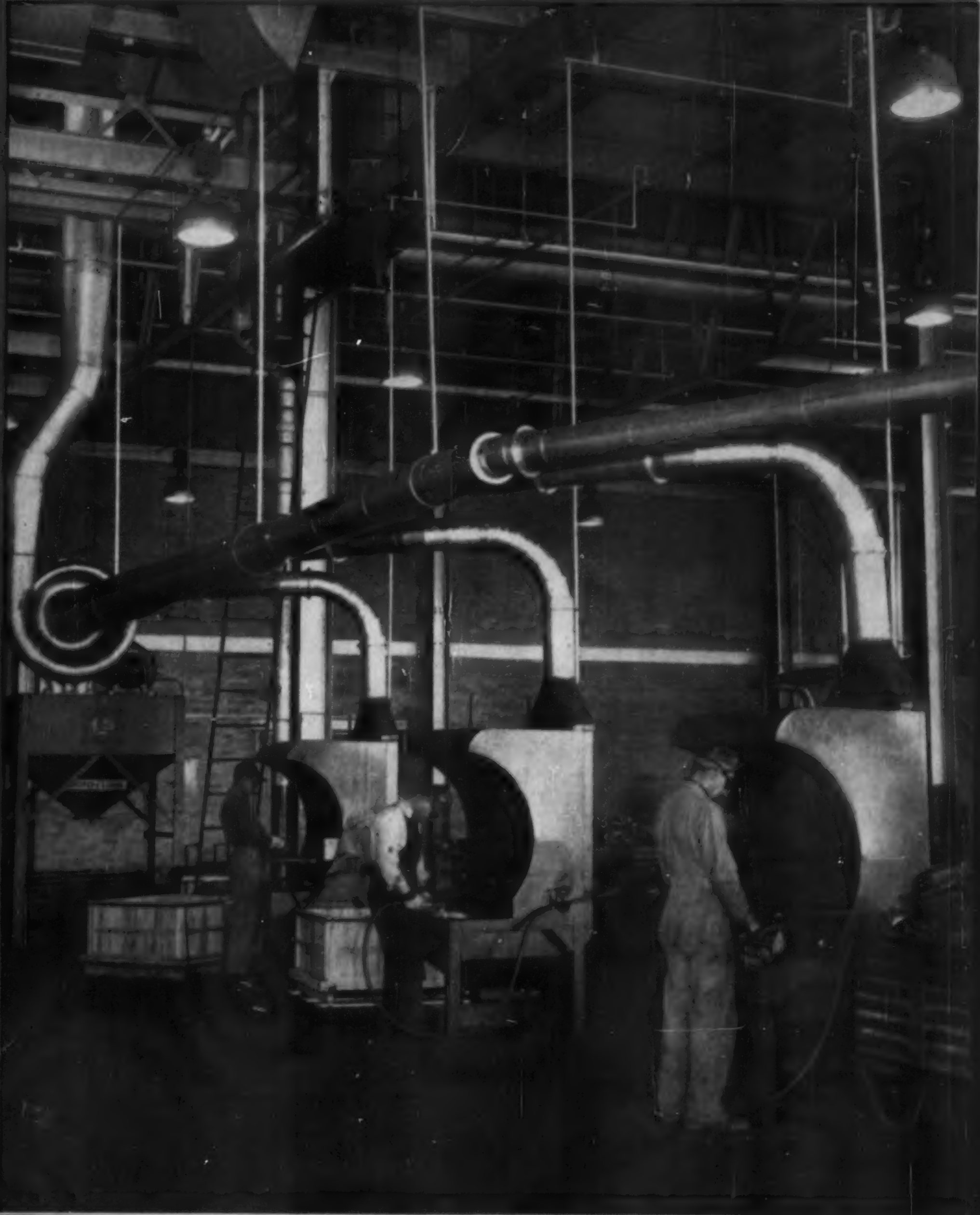
American Foundryman

FEBRUARY
1955

Houston AFS Convention
HOTEL RESERVATION BLANK
Page 51

The Foundrymen's Own Magazine



You take Federal's CROWN HILL Seacoal, GREEN BOND Bentonite and Federal SAND STABILIZER and you've got yourself three sand additives that will really simplify your sand control and provide uniform, thoroughly satisfactory results.

These three materials, added in varying amounts to your sand, dry or in slurry form, will give you close control over carbon content, green and dry strength, and will also provide GREATER FLOWABILITY, with LESS LUMPY SHAKEOUT.

CROWN HILL Seacoal is exceptionally low in sulphur content—which means your castings will have more easily-machined surfaces. GREEN BOND Bentonite is unexcelled in its ability to develop and control green and dry strength. It lasts and lasts—retaining its bonding efficiency much longer than any other clay. Its medium to low viscosity characteristics enable you to cut down on mulling time—permits slurry users to add more bentonite per gallon of slurry, for just the strength desired, without strain on the pumping system. Federal SAND STABILIZER improves resistance to expansion defects and increases flowability—thus increasing uniformity of mold hardness. It sharply reduces viscosity of slurry, without decreasing bond strength per gallon of slurry. And it provides better, LESS LUMPY SHAKEOUT without adding other clays to sand mixtures.

Yes, these Federal additives really simplify your sand control and give you excellent results. But, that's not all! *Their cost will not exceed $1.00 per ton of castings produced!* To learn more about these efficient additives, write for your copy of our bulletin on "Tailor-Made Molding Sands".

IMPORTANT

FOR SLURRY USERS!

The addition of Federal SAND STABILIZER to your slurry will definitely reduce its viscosity and increase its green strength. This enables you to add a greater percentage of Granulated GREEN BOND Bentonite* to your slurry—producing a more highly concentrated strength per gallon of slurry (lower water content)—with *less strain* on the pumping system and *no clogging* of pipe lines.

*Federal GREEN BOND Bentonite is available in three convenient forms:

(1) PULVERIZED—for general foundry use as a dry additive, for core or molding sand.

(2) GB-100 FINE GRANULAR—a dry additive with low dust content, for core or molding sand.

(3) No. 1200 SLURRY GRADE GRANULAR—for use as a wet additive.

All three grades have medium to low viscosity properties.

FEDERAL

If you have "lumpy shakeout" — use Federal SAND STABILIZER!

The FEDERAL FOUNDRY SUPPLY Company

4600 EAST 71st STREET, CLEVELAND 5, OHIO

CROWN HILL W. VA. • CHICAGO • DETROIT • MILWAUKEE • RICHMOND VA. • ST. LOUIS • CHATTANOOGA • NEW YORK • UPTON WYO.

American Foundryman

Volume 27 *February 1955* *Number 2*

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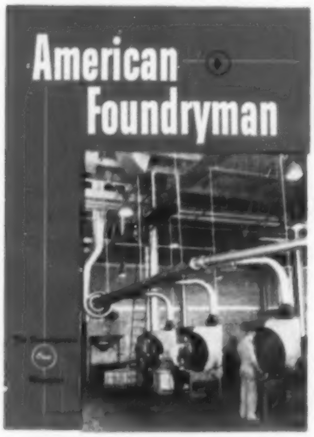

Grinding booths for small castings have forced-draft ventilation, and ample work and storage space that characterize all work areas in the Memphis Plant of International Harvester Co.

In This Issue . . .

Regular Departments . . .

AMERICAN FOUNDRYMAN is indexed by Engineering Index, Inc., 29 West 39th St., New York 18, N. Y. and is microfilmed by University Microfilms, 313 N. First St., Ann Arbor, Mich.

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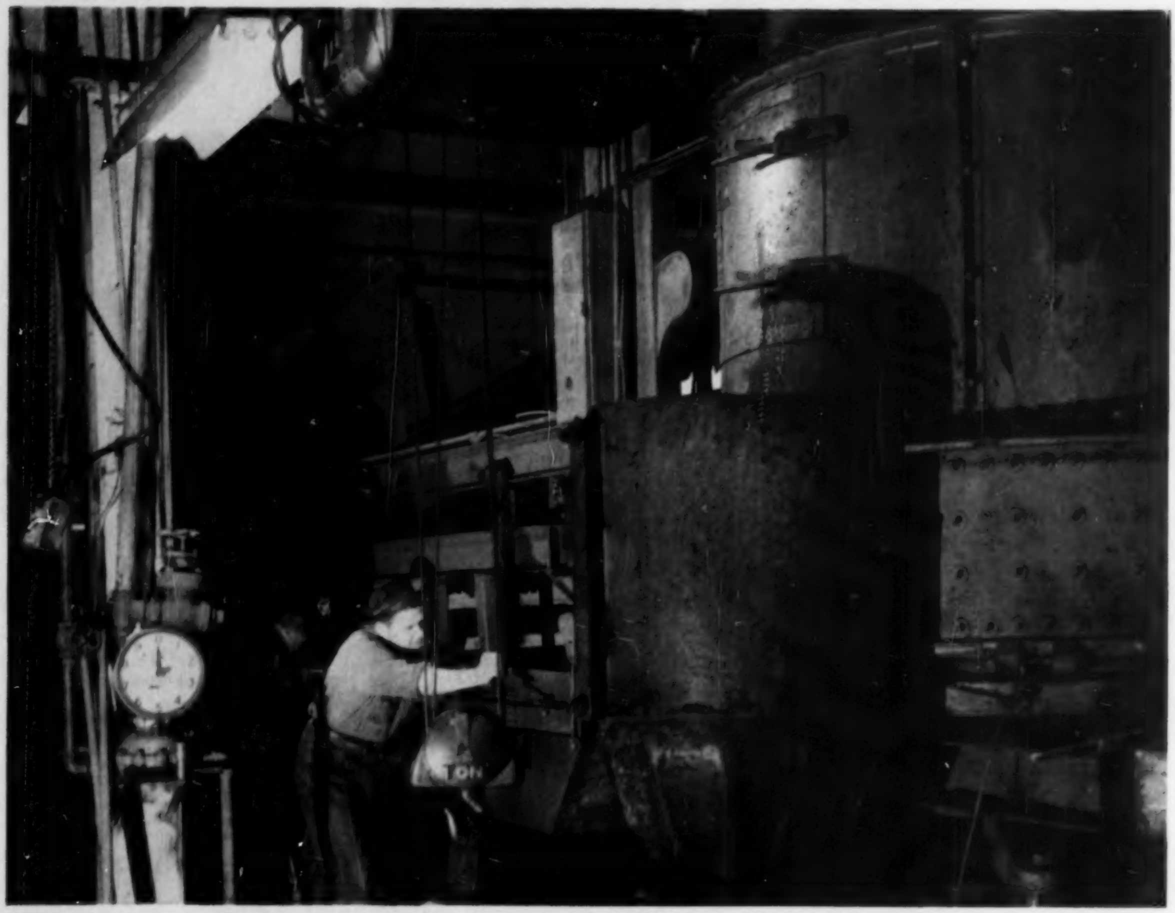
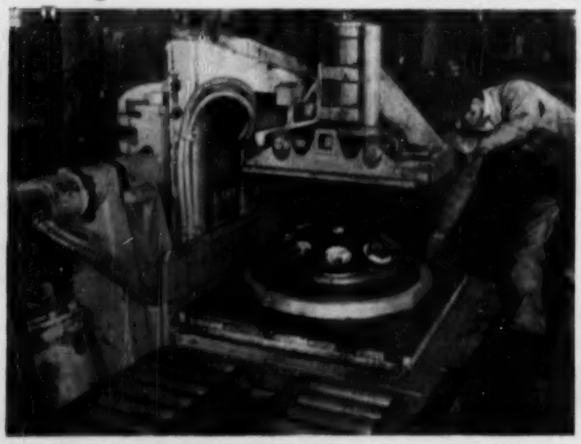


These Foundries Report Profits!

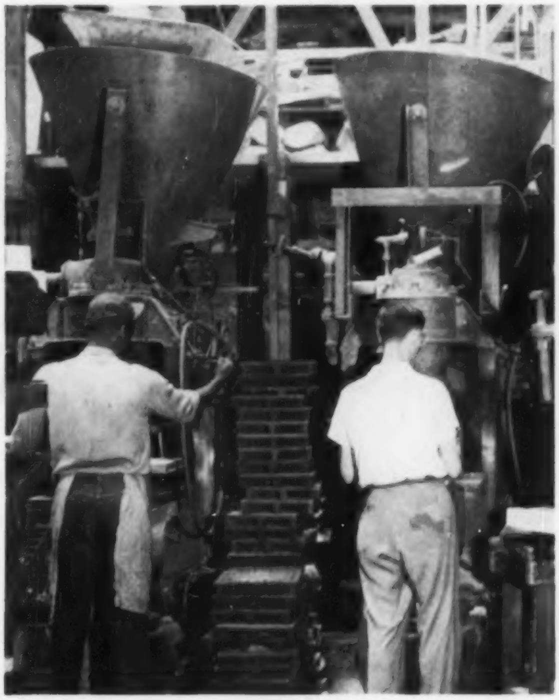
SPEEDMULLORS ON BOTH MOLDING LINES at the I. F. Sales Company foundry at New Philadelphia, Ohio, thoroughly mull all of the all-purpose sand required for 250,000 malleable castings per month. The sand is reused many times a day and enters the "70" Speedmullor (shown above) and the "50" on the other line, very hot. Speedmullor Cooling cools the sand during mulling. *For full information write Beardsley & Piper, 2424 N. Cicero Avenue, Chicago 39, Illinois.*



SPECIALLY DESIGNED FOR SLINGER INSTALLATIONS, this J & J Rol-A-Draw rolls over and precisely draws the molds rammed on a slinger-roller conveyor molding unit at Casting Service Corporation, LaPorte, Indiana. The Rol-A-Draw greatly simplifies the job of mold and pattern handling. *For full data write to Beardsley & Piper, 2424 N. Cicero Ave., Chicago 39, Illinois.*

ON THIS DIFFICULT COREMAKING JOB, CHAMPION JOLT ROLLOVERS are doing a fast precision job. The very deep-finned insert cores for aluminum cylinder heads are produced in large quantities. To fill and draw the deep thin fin sections requires perfect Champion jolting action and a precision Champion draw. *Obtain full data by writing Beardsley & Piper, 2424 N. Cicero Avenue, Chicago 39, Illinois.*

For more data, circle No. 928 on postage-free Reader Service card on p. 17 or 18

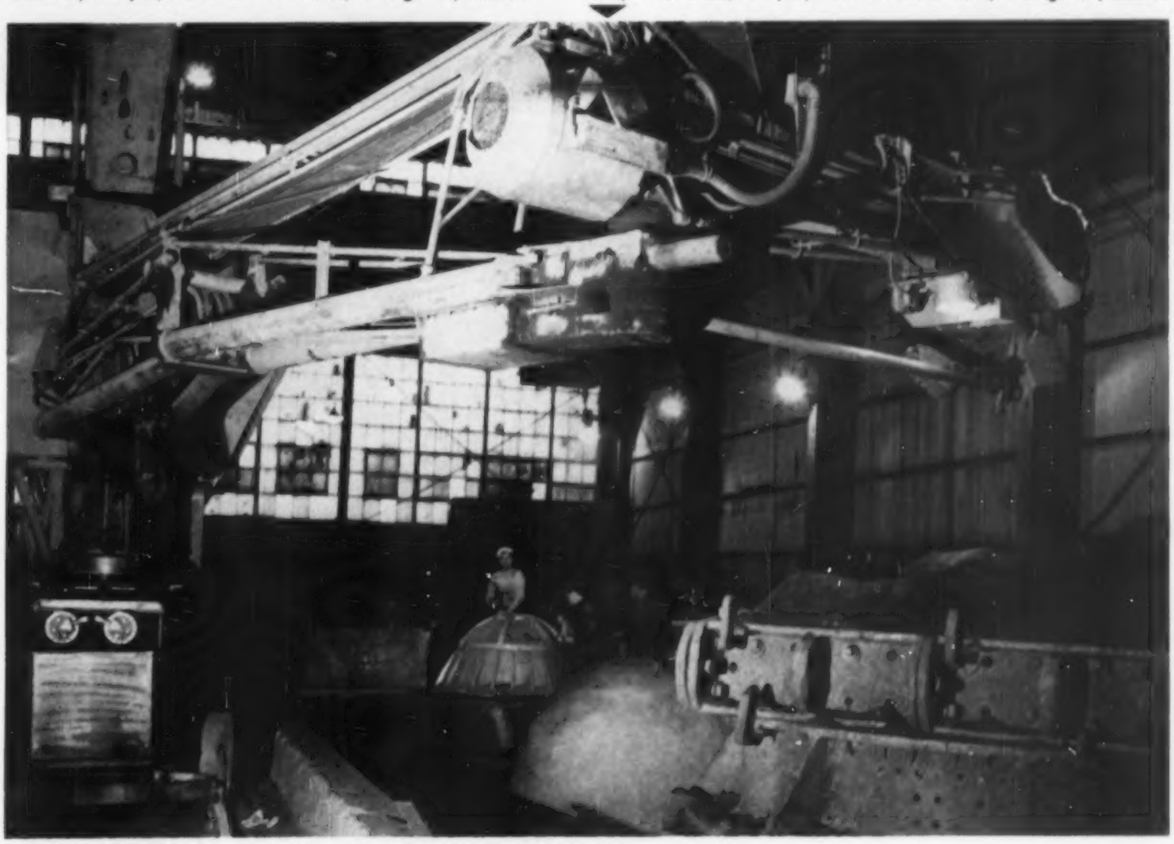


SCREENARATORS AND J&J JOLT SQUEEZERS handle much of the side floor molding at Harsch Bronze in Cleveland. *For more information write to Beardsley & Piper, 2424 N. Cicero Avenue, Chicago 39, Illinois.*

A JR. NITE GANG CUTS COSTS in side floor molding sand preparation at the Kasper Foundry, Elyria, Ohio. *For full information write to Beardsley & Piper, 2424 N. Cicero Avenue, Chicago 39, Illinois.*

CHAMPION FLEXIBLOS IN THIS MAGNESIUM FOUNDRY mean real savings on small and medium size cores. In producing precision magnesium aircraft castings, the Howard Foundry in Chicago depends on Champion Flexiblo Core Blowers and Speedmullors. *For more data on this interesting operation write now to Beardsley & Piper, 2424 N. Cicero Ave., Chicago 39, Illinois.*

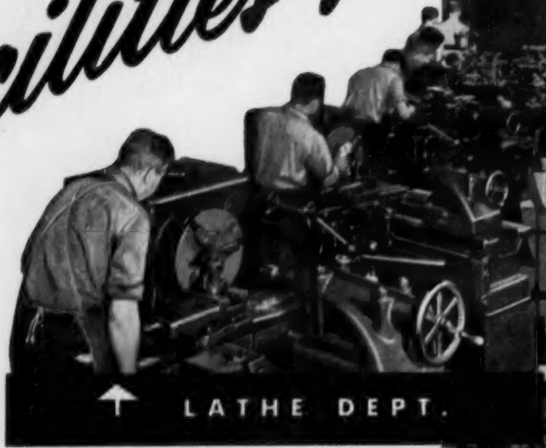
PITTSBURGH STEEL'S FOUR SPEEDSLINGERS AND A SANDSLINGER ram a major portion of that foundry's molds. Jobbing work ranging from several pounds to well over 200,000 pounds is produced. Slingers are indispensible in this operation. *For the full story write today to Beardsley & Piper, 2424 N. Cicero Ave., Chicago 39, Illinois.*



can you use these

Facilities?

FOUNDRY DEPT.



LATHE DEPT.

MILLING DEPT.

...they're ready and able to serve you.

If you are looking for a reliable source for lathe work, milling and shaper work or non-ferrous castings (finish-machined or not) the chances are that City Pattern Foundry & Machine Company can fill the bill for you.

Each of these machining departments have a wide variety of modern equipment to handle almost any type of work that you might need. You'll find City Pattern Foundry and Machine Company an interested and economical source for both short and long runs.

In the foundry department you will find one of the most versatile and modern layouts in this part of the country. And, every conceivable laboratory control and testing device is on hand to insure chemical and physical specifications.

We will welcome the opportunity to give you more detailed information . . . won't you drop us a line or call in your specific requirements?

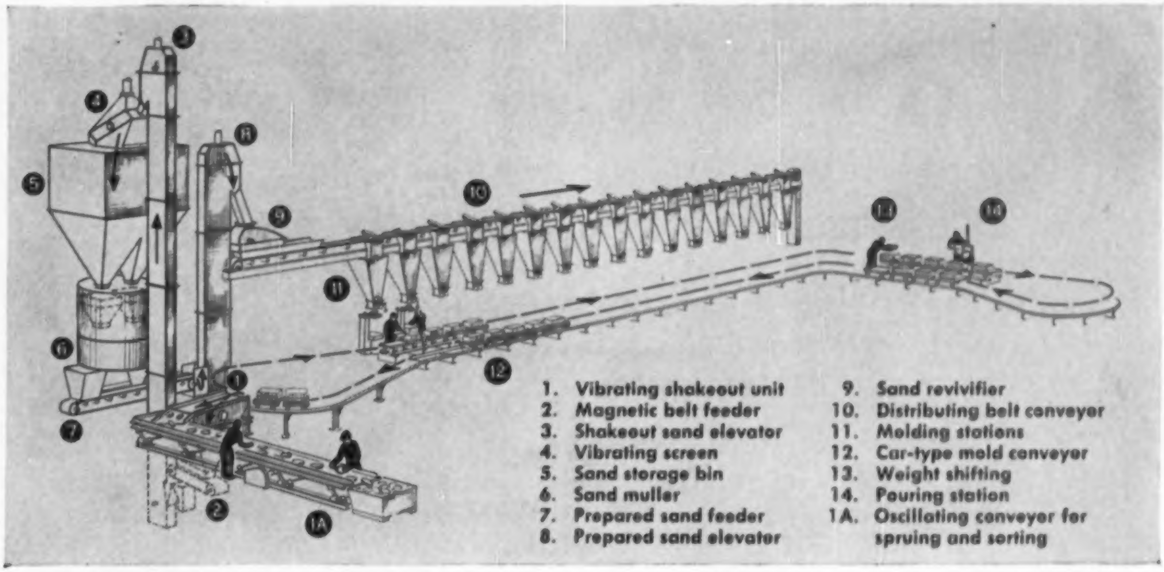
OUR NEW BROCHURE

Our colorful new brochure details our complete facilities for pattern work, foundry work and precision machining. Each department is completely illustrated with over forty recent illustrations. Your request will bring one to you promptly and without charge.

CITY PATTERN

FOUNDRY AND MACHINE CO.

PHONE TR-4-2000 • 1161 HARPER AVE. • DETROIT 11, MICH.



In this modern foundry layout, movement of sand and castings is completely mechanized. With Link-Belt conveying and preparation equipment, gray iron, steel, malleable and non-ferrous foundries can have lower costs, increased output.

Link-Belt automatic shakeout steps up production, removes workmen from hazardous areas, frees them for other jobs.

Conditioned sand is quickly, conveniently distributed to molders' hoppers by flat roll belt conveyor with adjustable plows.

Ideal for handling hot sand and castings, Oscillating conveyors speed cooling, spruing and sorting of castings while en route.

Link-Belt mechanization not only makes large and small foundries a better place to work - - it

raises production-lowers unit costs

TODAY, large and small foundries alike find modernization the only answer to intensified competition. To bring down their costs and make the most efficient use of manpower, they have conveyorized sand and casting handling to a degree undreamed of even a few years ago.

Many of these progressive foundries are completely equipped with Link-Belt conveying and preparation equipment. And just as others have been able to produce better castings at lower cost, Link-Belt mechanization can step up your profits, too. That applies whether your foundry is gray iron, steel, malleable or non-ferrous. Whatever you require in equipment or engineering services, Link-Belt can cut your operating costs . . . and at the same time make your foundry a better place in which to work.

Whenever you have a castings or sand handling or preparation problem, you'll find it pays to call your nearby Link-Belt office. Ask for Book 2423. It shows Link-Belt's complete line of modern equipment for ferrous and non-ferrous foundries plus 7 tested layouts.

LINK-BELT

13,741

CONVEYORS AND PREPARATION MACHINERY

FEMA MEMBER

LINK-BELT COMPANY: Executive Offices, 307 N. Michigan Ave., Chicago 1. To Serve Industry There Are Link-Belt Plants and Sales Offices in All Principal Cities. Export Office, New York 7; Canada, Scarboro (Toronto 13); Australia, Marrickville, N.S.W.; South Africa, Springs. Representatives Throughout the World.

For more facts, circle No. 941 on postage-free Reader Service card on p. 17 or 18

It's a proved fact that the quality of bentonite you use in molding can determine the amount of money you lose by rejects. Try and save a few cents by using poorer quality bentonite and you may lose hundreds of dollars. Good bentonite is good insurance for your profits . . . and good bentonite means National Bentonite. Here's why:

National Bentonite is selected from only the finest types of bentonite in the world. It is processed with laboratory exactness so it is always the same, uniform high quality. It provides excellent mold durability, yields higher permeability, has good green strength, higher tensile strength, higher hot strength, and higher sintering point. Besides that, National Bentonite requires less water to bond, so reduces the amount of vapor to be vented. All points considered, National Bentonite offers you greater quality and better characteristics to make good sand molds. This is why scores of good foundrymen have specified National Bentonite for years.

Available from better foundry suppliers everywhere. Write or phone today for specifications and prices.

Baroid

Baroid Division ☆ National Lead Company
Bentonite Sales Office: Railway Exchange Building, Chicago 4, Illinois

For more data, circle No. 959 on postage-free Reader Service card on p. 17 or 18

Products & Processes

Fill out postcards on pages 17-18 for complete information on items listed on pages 10-12-17-18-20

▼ Wet-Type Dust Collector

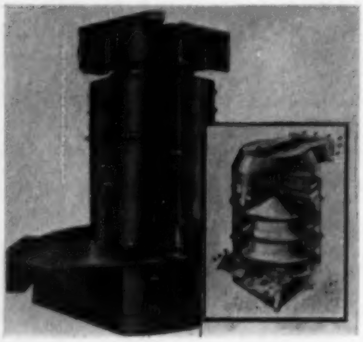
A wet-type dust and fume collector based on a new operating principle has been developed. Unit consists of a cylindrical drum with a series of cones and baffles. Water, supplied by a direct driven pump, cascades downward within the collector. This action produces a series of closely related water curtains through which the dust-ladened air is filtered in its upward travel. Descriptive literature and complete technical details on Van-Truer dust collectors are available on request. *Van-Truer Co., Inc.*

For more facts, circle No. 877 on p. 17

▲ Rollover-Draw Core Blower

The TR Cormatic, combining a new high speed trunnion-type core rollover and draw machine with a Champion Blomatic core blower, has been announced. New trunnion type Rol-A-Cor, the TR Rol-A-Cor, handles two core boxes on a roller equipped frame that rotates about a trunnion axis. The total time cycle for the blowing, indexing, rollover, draw, and elevation of a complete core to handling height is 15 seconds. Four cycles are completed each minute. *Beardsley & Piper Div., Pettibone Mulliken Corp.*

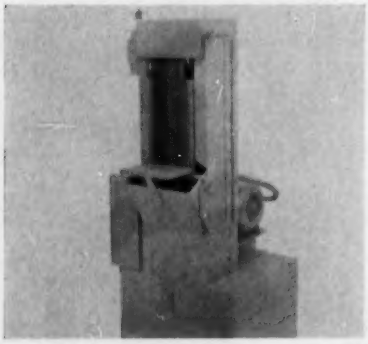
For more facts, circle No. 875 on p. 17



▲ Weight-Count System

Announcement has been made of the new Printweight "weight-count" system. Now scales that count hundreds of parts accurately in a few seconds can print both the weight and the count. Unit equipped with selective numbering equipment, permits the printing of any count up to 9,999, simultaneously with the weight figure. Printweight with selective numbering is available for bench, portable, floor and built-in counting scales. Descriptive literature is available upon request. *Toledo Scale Co.*

For more facts, circle No. 879 on p. 17



▼ New Welding Technique

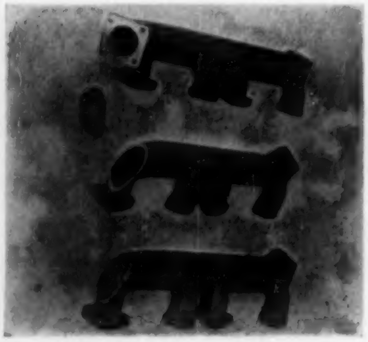
Basis of a new technique for welding steel to cast iron is a recently developed electrode having a bi-metallic core of copper and mild steel, with arc-shielding flux coating. In operation it is very similar to the arc welding of mild steel with coated electrodes, in that the arc is fast and smooth and the deposit flows freely. Photo shows manifold as cast (top illustration), as prepared for welding and with the rolled steel plate welded in place to seal off exhaust outlet. *C. E. Phillips & Co.*

For more facts, circle No. 878 on p. 17

▲ Belt Grinder

Model 100 Belt Grinder for heavy duty production grinding of castings, forgings, weldments, etc., has been introduced. Grinder, which is for both ferrous and non-ferrous metals, is constructed for wet grinding with a built-in coolant reservoir and coolant collecting troughs. All bearings are ball or roller type with protective seals to keep out grinding dust. Belts can be changed easily and quickly. Close tolerances can be held. Descriptive literature is available upon request. *Ven Corp.*

For more facts, circle No. 876 on p. 17



▲ Sampling Gun

Leco Sampling Gun is a convenient, pistol shaped unit for rapid sampling of ferrous and non-ferrous metals and alloys in the molten condition. It has been used successfully for cast iron, steel and die cast metal melts. A piece of Pyrex tubing is inserted into the gun barrel, and the unit is cocked. It is then dipped momentarily into the melt and the trigger pulled. The sample is immediately sucked up into the tubing where it solidifies. *Laboratory Equipment Corp.*

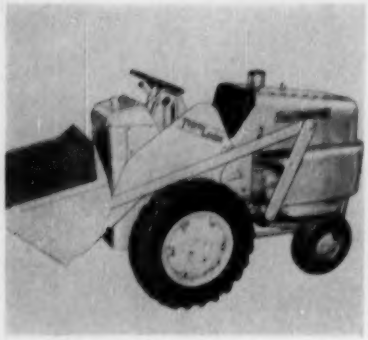
For more facts, circle No. 880 on p. 17

continued on page 12

Products & Processes

continued from page 10

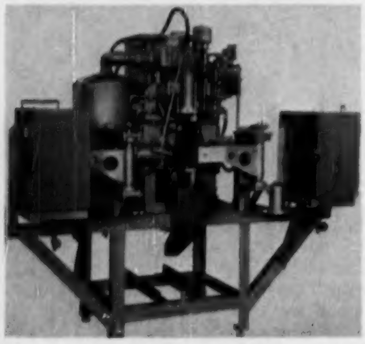
Fill out postcards on pages 17-18 for complete information on items listed on pages 10-12-17-18-20



▲ Tractor Shovel

The TL-6 Tracto-Loader weighs 6000 lb and is equipped with a combination clutch type transmission and torque converter drive. Bucket is rated at ½ cu yd and in addition to the automatic tip back during the boom raising cycle, it can be tipped back 21° at ground level. Overall length of the unit with the bucket at a 3 ft carry position is 10 ft-1 in., and the overall width is 4 ft-5 in. These dimensions along with the turning radius of 6 ft-6 in. make it ideal for working in confined areas. *Tractomotive Corp.*

For more facts, circle No. 881 on p. 17



▲ Hollow Core Machine

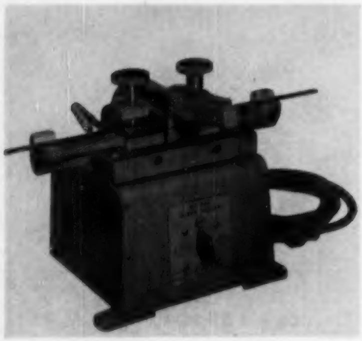
Development of a new core making machine that produces hollow cores on a high production basis, has been announced. Designated Model 10, new unit is a two-station machine that requires only one operator. It makes finished cores without the use of separate dryers or core ovens, and can be installed as an integral unit in molding machine production lines because the cores are ready to use when removed from the core boxes. Additional details are available on request. *SPO, Inc.*

For more facts, circle No. 882 on p. 17

▼ Band Saw Brazer

"Oliver" No. 562, new electric band saw brazer is used to braze band saw blades from ⅛ in. up to 1½ in. wide. Unit utilizes the electric heat of resistance for melting down the soldering metal. It needs no specially skilled workman. It is so well insulated and the voltage at point of action is so low that no shock can be given to operator and if too much current is turned on, the saw will melt at point of brazing and break the electric circuit, so no damage can be done. *Oliver Machinery Co.*

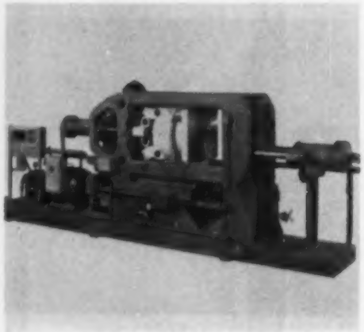
For more facts, circle No. 883 on p. 17



▼ Metalworking Lathe

An 11 in. cabinet model variable speed drive lathe with 24 in. capacity center to center, and 1 in. collect capacity has been announced. Diameter of the hole through the spindle is 1⅜ in. Outstanding feature of the new tool is a patented back gear shift lever—the first of its kind ever developed, it is claimed. Another unique feature of the new machine is a perfected vari-speed drive offering a speed range of 44 to 1550 rpm with an infinite choice within that range. *Delta Power Tool Div., Rockwell Mfg. Co.*

For more facts, circle No. 884 on p. 17



▲ Die Casting Machine

A 400 ton aluminum die casting machine has been introduced, designed to cast up to 6⅜ lb of aluminum or proportionate weights of magnesium or brass. In the shot assembly the machine provides 21,000 psi maximum pressure on metal. Both shot speed and pressure are adjustable with an A.S.M.E. approved nitrogen accumulator giving high speed injection. The water-cooled plunger tip prevents binding. Two fixed shot positions are provided. Specifications are available on request. *Lester-Phoenix, Inc.*

For more facts, circle No. 885 on p. 17

▲ Improved Payloader

An improved Payloader tractor-shovel with bucket capacity of 1 cu yd payload and ¾ cu yd struck load has been announced. Designated as the Model HFC, it is a rear-wheel drive model and features a combination of a special new Hough-built transmission, plus torque-converter drive. The torque-converter is of the self-cooled, three-element type. Additional information is available on request. *Frank G. Hough Co.*

For more facts, circle No. 886 on p. 17

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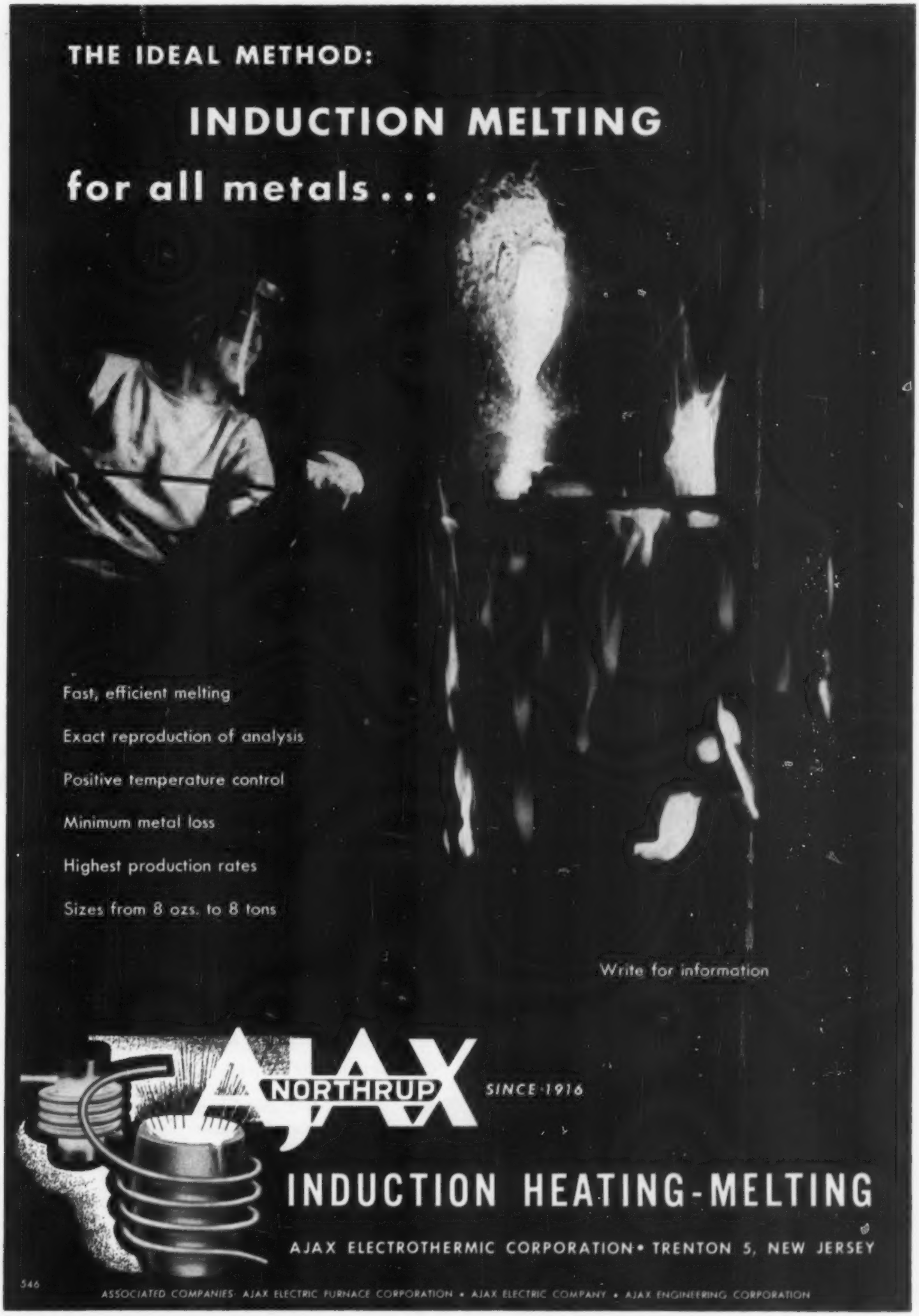


For more data, circle No. 954 on postage-free Reader Service card on p. 17 or 18

DELTA FOUNDRY PRODUCTS

CORE AND MOLD WASHES

FOR STEEL:
- Delta Special Core and Mold Wash Base
- Delta SteelKoat
- Delta PyroKoat S

FOR ALL TYPES OF SAND CAST METALS:
- Delta ThermoKoat
- Delta Z-Koat
- Delta Z Z-Koat

FOR GRAY IRON, MALLEABLE, BRONZE AND BRASS:
- Delta GraKoat
- Delta BlacKoat
- Delta DriKoat

FOR GRAY IRON:
- Delta BlacKoat S-5

FOR NON-FERROUS AND LIGHT METALS:
- Delta NonferrusKoat

•

PARTING COMPOUNDS
- Delta Partex
- Delta Liquid Parting

•

MUDDING AND PATCHING COMPOUNDS
- Delta Sliktite
- Delta Ebony

•

NO-VEIN COMPOUND

•

MOLD SURFACE BINDERS — LIQUID
- Delta Spray Binders

•

PERMI-BOND

•

DRI-BOND
(Dry Binder)

•

BONDITE BINDER

•

LIQUID RESINS AND BINDERS
- Delta 155-X Fast-Dri
- Delta 168-X Fast-Dri

•

96-B SAND RELEASE AGENT
SAND CONDITIONING OIL

•

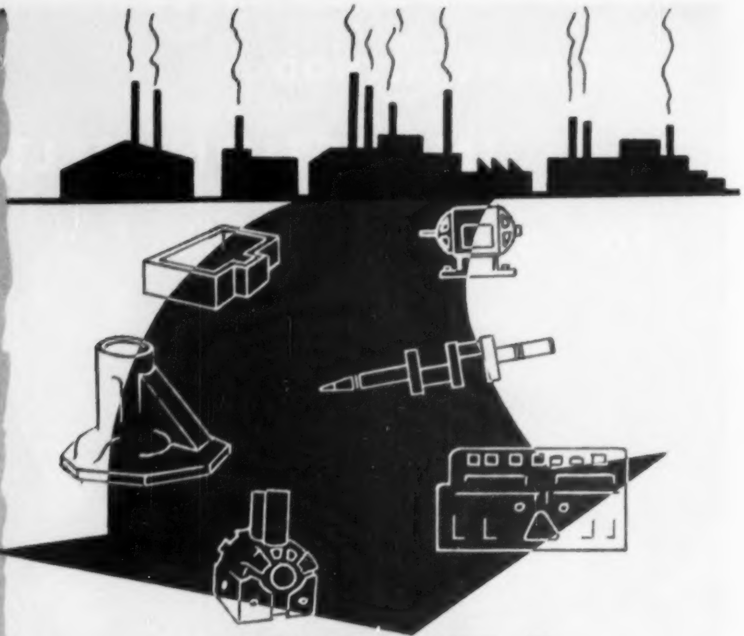
CORE ROD DIP OIL

•

CORE OILS

•

DELTA-DIETERT PROCESS BINDER 103XX
(For "D" process shell cores.)



DELTA
FOUNDRY PRODUCTS
SPEED
PRODUCTION OF
BETTER, CLEANER CASTINGS
AT
lower cost

Every DELTA Foundry Product has been scientifically developed to provide more speed and greater economy in the production of finer-finished castings. DELTA'S scientific control safeguards the higher quality and maintains the absolute uniformity of product so essential to consistently better results.

Get the Facts . . . Working samples and complete literature on Delta Foundry Products will be sent to you on request for test purposes in your own foundry.

DELTA

DELTA OIL PRODUCTS CO.
MANUFACTURERS OF SCIENTIFICALLY CONTROLLED FOUNDRY PRODUCTS

MILWAUKEE 9, WISCONSIN

For more data, circle No. 931 on postage-free Reader Service card on p. 17 or 18

"TELL-ALL" panel gives you four advantages

The *Foundromatic* dryer gives you all the advantages of dielectric drying plus the operational convenience and simplicity of "Tell-All" control.

1. Meters, lights, buttons are panel mounted at eye level, enabling operator to keep on top of operation at all times.

2. Electrode control permits adjusting to the physical variances of cores.

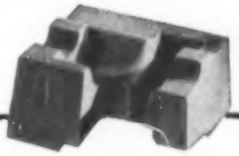
3. Electrical overloading is prevented by the belt-loading control. Conveyor stops when load is too great.

4. Automatic grid control assures correct drive to oscillator tube regardless of oven load.

Advantages of Dielectric Drying Over Oven Drying

Drying time measured in minutes — smoother core finishes — superior shakeout characteristics — clean, cool core rooms — elimination of core storage — 60% fuel savings — all these advantages are yours with dielectric drying.

Compare features and operating records of the various dielectric dryers available. You will discover, because it is easier to operate, the *Foundromatic* dryer augments and multiplies the inherent advantages of the dielectric method.



Six minutes is all it takes to dry this core in a *Foundromatic* dryer. The job would take 70 minutes in a conventional oven.

Get all the facts on dielectric core drying — call your nearby Allis-Chalmers district office or write Allis-Chalmers, Milwaukee 1, Wisconsin. Ask for Bulletin 15B7306B.

A-4450

Foundromatic is an Allis-Chalmers trademark.

ALLIS-CHALMERS

For more data, circle No. 926 on postage-free Reader Service card on p. 17 or 18

VOLCLAY BENTONITE

NEWS LETTER No. 37

REPORTING NEWS AND DEVELOPMENTS IN THE FOUNDRY USE OF BENTONITE

Is Venting Important?

Years ago, the old-timer considered venting with a proper vent rod as important as the molding or pouring operation. Was he right or wrong?

The old-timer vented to reduce gas pressure. He did not appear to recognize the word "permeability", nor did he directly associate scabs, buckles, and rat-tails with a molding sand condition that could be cured by proper sand control.

He usually thought of these indented depressions in the casting as being due solely to gas pressure. Consequently, to relieve this mold-metal gas pressure, he vented.

Remember, the old-timer worked with naturally bonded sands rather than with the present synthetic or compounded sand mixtures. The permeability of these naturally bonded sands was usually much lower than in the present average synthetic sand mixture now used in the same foundry. Although control was as essential with naturally bonded sands as with the present synthetic compounded sands, sand control was neglected in these early foundries.

Many of these early, naturally bonded sands were weak. They were often very wet on arrival and contained a preponderance of roots, clay-balls and other contaminated fines. Molding sand costs were watched closely, and very little new sand was added to the foundry heap. Furthermore, very little of the old sand was thrown from the foundry. Much of the gangway foundry sand and the fine trash around the shake-out found its way into the molding sand and there accumulated.

For lack of mulling equipment, few foundries attempted to add bentonite to build-up the strength without sacrificing the casting finish. The sands were generally accepted as shipped and little effort made to control or correct the behavior of the molding sand.

After a lengthy use of such sands, the old-timer was usually forced to add a large amount of water to work the molding sand since loose patterns were chiefly used. Not many of the patterns were mounted, and production foundries were in their infancy.

This excess moisture had to be considered, and the molder's best method was by venting.

We believe that these weak sands required so much water to give "false plasticity" that the old-timer was forced to vent.

Regardless of opinion, excess moisture produces steam pressure, and where excess moisture is used, venting has been beneficial.

We are not stating that venting is necessary, but where it has been done there has been a definite reason for its use. It is our opinion that it has been habit-forming, and it is true that venting has ruined many patterns.

Many believe the real value of venting is not to relieve steam pressure but to punch the molding sand with vent holes that best allow the sand to expand more freely. Consequently, fewer scabs, buckles and rat-tails occur.

Venting is usually successful where high expanding sands are used for the above reason. High moisture content, weak sands, low permeable sands, combined with a high mold hardness easily creates high expansion. Thus, venting was the old-timer's way of controlling these difficulties.

Present working knowledge of sands has minimized the use of venting, and the control of synthetic sands has allowed more Volclay Western Bentonite to be used by the foundry. Labor saved in ramming, jolting, butting, and tucking by maintaining green compression strength with Volcay or Panther Creek Bentonite has greatly widened the road toward further use of synthetic sand mixtures.

AMERICAN COLLOID COMPANY

Chicago 54, Illinois • *Producers of Volclay and Panther Creek Bentonite*

For more data, circle No. 922 on postage-free Reader Service card on p. 17 or 18

Products & Processes

continued from page 12

Fill out postcards on pages 17-18 for complete information on items listed on pages 10-12-17-18-20

Riser Compound

HT-20, a new and improved non-carbon exothermic head compound, which is used to assure complete feeding and sound castings with a minimum height risers, has been announced. It will not form a hard crust and can be molded into shapes. *Asbury Graphite Mills, Inc.*

For more facts, circle No. 887 on card

Portable Tester

A portable, light weight, hardness tester, guaranteed to make accurate Brinell tests on non-ferrous alloys of all kinds has been developed. Removable test head makes it possible to test parts of any size or shape and it can be used in any position, with or without the base. *Andrew King.*

For more facts, circle No. 893 on card

Production Control Quantometer

A simplified Production Control Quantometer, for companies who have need for regular, but limited spectochemical analysis, has been announced. Known as Model 8950, it has many of the automatic features removed for economy. *Applied Research Laboratories.*

For more facts, circle No. 888 on card

Mobile Suction Unit

Announcement of the redesigned and improved Floormobile, a mobile suction unit which makes practical and economical suction cleaning of large floor areas, has been made. Unit will pick up dust, dirt and trash at the rate of 20,000 sq ft an hour. *Handling Devices Co., Inc.*

For more facts, circle No. 894 on card

Furnace Roof Insulation

Therm-O-Flake Coating, a light weight plaster-type insulation, composed of expanded vermiculite combined with mineral binders and asbestos fibers is used on electric furnace roofs; to insulate core ovens, mold drying ovens, and annealing ovens. *Illinois Clay Products Co.*

For more facts, circle No. 889 on card

Combination Burners

Something new for radiant tube firing in controlled atmosphere furnaces, is the Hauck Series 630-P Combination Burners. Flame length can be changed to fit the tube, by means of the flame adjusting lever. Either gas or oil can be burned. *Hauck Mfg. Co.*

For more facts, circle No. 890 on card

Silicone Parting Agent

A new stable silicone parting agent, Mold Release Emulsion 36, for metal, plastics and rubber has been introduced. Unaffected by additives or common metals, it creams only slightly upon standing three days in a 100:1 dilution. *Dow Corning Corp.*

For more facts, circle No. 891 on card

Ultrasonics for Inspection

Ultrasonic vibration has been applied to the visible penetrant inspection method with improvement in speed and effectiveness. It can also be used for general surface cleaning when the ultimate in soil removal is desired for plating, painting and other processing. *Met-L-Chek Co.*

For more facts, circle No. 892 on card

More data, information, prices can be obtained on all advertised and listed products, bulletins, services by using postage-free Reader Service card

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AMERICAN FOUNDRYMAN

Golf & Wolf Roads

Des Plaines, Illinois

Free Foundry Information

Fill out postcards on pages 17-18 for complete information on items listed on pages 10-12-17-18-20

Cupola Flux

Bulletin No. 46-B points out how Cornell Cupola Flux produces a cleaner metal with greater fluidity and increases efficiency in cupola operation giving cleaner drops with bridging over practically eliminated. Cupola linings need less patching. *Cleveland Flux Co.*

For more facts, circle No. 895 on card

Industrial Air Conditioners

Bulletin No. 1301A, "Crane Cab Conditioners," points out how unit pays big dividends by providing effective protection from excessive heat, dust, dirt and fumes. Temperatures are held at a 75-85F maximum, while ambients may soar as high as 180 F. *Dravo Corp.*

For more facts, circle No. 897 on card

Automatic Sand Control

Detailed bulletin points out how automatic control of sand preparation has been further simplified and refined by a new Skiptrol device. Skiptrol accurately controls loading of the Speedmullor skip-hoist bucket. *Beardsley & Piper, Div. Pettibone Mulliken Corp.*

For more facts, circle No. 899 on card

Electric Vibrators

Illustrated brochure points out how Syntron Electric Vibrators are easily installed on sand hoppers above molding stations or on large sand storage bins. Operation can be tied in with discharge gate. Gate open, vibrator on—gate closed, vibrator off. *Syntron Co.*

For more facts, circle No. 896 on card

Sand Stabilizer

Bulletin No. 8170 describes Archer LIN-O-CEL, a foundry sand stabilizer. Tells how it improves flowability, produces better finish and cuts cleaning time. Finely ground cellulose material "cushions" sand expansion and eliminates stresses at mold surface. *Archer-Daniels-Midland Co.*

For more facts, circle No. 898 on card

Silicone Parting Agent

Information is available on Dow Corning 8 Emulsion, a silicone parting agent especially designed for the shell process. Emulsion can't break down to form a carbonaceous deposit on patterns and cleaning costs are minimized and production is increased. *Dow Corning Corp.*

For more facts, circle No. 900 on card

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Metals Catalog

New catalog, *Electromet Ferro-Alloys and Metals*, contains information about Boron, Calcium, Chromium, Columbium, Manganese, Sillicomanganese, Silicon, Titanium, Tungsten, Vanadium, Zirconium, "EM" Briquetts and other alloys and metals. *Electro Metallurgical Co.*

For more facts, circle No. 901 on card

Molding Machine

Bulletin JDP describes the International Type "JDP" Machine, which has a positive jolt and a true ram. The action is accomplished by the use of two jolt sections, combined in one integral part. Positive ram throughout the mold. *International Molding Machine Co.*

For more facts, circle No. 902 on card

Hand-Tilt Furnace

Bulletin No. 400 describes the Lindberg-Fisher type BB1 Hand-Tilt Crucible Furnace. Tilting mechanism consists of a hand wheel, driven through machined worm and pinion reducing gears. Capacities 50 to #400 crucible. Oil or gas fired. *Lindberg-Fisher Melting Furnaces.*

For more facts, circle No. 903 on card

Equipment Catalogs

Four catalogs, No. 147, No. 147-A, No. 150 and No. P-152, are available. No. 147 covers metal pouring systems, No. 147-A deals with cupolas, chargers, etc.; No. 150 covers cranes and crane trucks, and No. P-152 deals with pouring devices. *Modern Equipment Co.*

For more facts, circle No. 904 on card

continued on page 20


CHIEF KEOKUK:
"Me no need teach Little Chief—him say modern generation learn make teepee on TV!"
PRINCESS WENATCHEE:
"As usual he has the situation well under control!"
dick stone

Free Foundry Information

continued from page 18

Fill out postcards on pages 17-18 for complete information on items listed on pages 10-12-17-18-20

Railroad Car Vibrators

Literature is available on the Cleveland Type LSRR and HCRR vibrators, especially designed to solve railroad car unloading problems. Vibrators fit easily into the female brackets on hopper cars or can be attached to any structural member of a railroad car. *Cleveland Vibrator Co.*

For more facts, circle No. 905 on p. 18

Sand Conditioner

Literature is available on Delta Permi-Bond, a development which eliminated the use of sea coal in molding sands. It is a specially prepared pure hydrocarbon, completely volatile at elevated temperatures. Greatly reduces gas, smoke and soot in the foundry. *Delta Oil Products Co.*

For more facts, circle No. 906 on p. 18

Tool Grinders

Bulletin No. 585 describes the Oliver No. 585 Oilstone Tool Grinder. Covers coarse oilstone, fine oilstone, general grinding wheel, grinding cone, stropping wheel and tool holders. Unit has direct motor drive and can be connected to electric light socket. *Oliver Machinery Company.*

For more facts, circle No. 907 on p. 18

pH Meter

Bulletin No. 118 explains the Photovolt pH Meter Model 125, for pH of molding sands. Unit is powered by only three ordinary radio batteries which give 2000 hours reliable service. Meter, which is portable, is simple and fast in operation. *Photovolt Corp.*

For more facts, circle No. 908 on p. 18

Electric Furnaces

Bulletin No. 9 describes the electric-furnace duplexing process, which makes it possible to produce special irons for a great variety of castings requiring heat and wear resistance and the ability to withstand extreme pressure. *Pittsburgh Lectromelt Furnace Corp.*

For more facts, circle No. 909 on p. 18

Powdered Phenolic Resin

Bulletin F-3 points out how Foundrez 7500 saves time, labor and materials when making shell molds with the two-stage thermosetting, powdered phenolic resin. Claims that castings are so accurate that almost no machining is required. *Reichhold Chemicals, Inc.*

For more facts, circle No. 910 on p. 18

Dust Control System

Building Ventilation Balance Dust Control System literature is now available. Points out how compensating Air Uniflo Ventilation Hoods minimize exhaust of needed building heat because each unit balances its own air intake and exhaust. *Claude B. Schneible Co.*

For more facts, circle No. 911 on p. 18

Foundry Flasks

Catalog describing foundry flasks made of rolled steel with a tensile strength of 70,000 psi, is now available. Tells how Sterling Flasks are all-steel welded into one solid, rigid piece, with center-rib rolled into each section to fortify against torsional strains. *Sterling Wheelbarrow Company.*

For more facts, circle No. 912 on p. 18

FREE TEAR SHEETS

of all AMERICAN FOUNDRYMAN articles are available on request. Keep your magazine intact and pass it on for others to use. For free tear sheets, write to Editor, AMERICAN FOUNDRYMAN, Golf & Wolf Roads, Des Plaines, Ill. Please show company connection and your title on tear sheet request.

Fast-Drying Sprays

Bulletin F-109 gives information on Stevens Fast-Drying Sprays to speed up drying of cores and molds. Covers Stevens Quik-Dry, an ignitable solvent carrier; Stevens Speedri, for faster torch drying; and Stevens Ignisol, for air drying in one hour. *Frederic B. Stevens, Inc.*

For more facts, circle No. 913 on p. 18

Overhead Cranes

Bulletin Unit 79, *How to Select an Overhead Crane*, gives information needed for planning and selecting the overhead crane that will give the best performance at the lowest cost. A helpful, technical bulletin, it is packed with important data. *Whiting Corp.*

For more facts, circle No. 914 on p. 18

Quarterly Publication

Wheelabrator Tips is a new quarterly publication published for the benefit of users of Wheelabrator airless blast cleaning equipment. Publication will be devoted to helpful hints and discussions on better operating methods and better maintenance. *American Wheelabrator & Equipment Corp.*

For more facts, circle No. 915 on p. 18

Grinders

Bulletin G-54 illustrates and describes many types of grinders, including the pedestal grinder, snagging grinders, disc grinders, drill grinders, wet grinders, die grinders, high production automatic rotary grinders and heavy duty 6 in. carbide tool grinder. *Standard Electrical Tool Co.*

For more facts, circle No. 916 on p. 18

Sealing Compound

Pamphlet points out how Whitehead's Joint Seal Compound gives a complete seal on dry sand molds; seals off core vents; forms sealing gasket for pouring basins and runner boxes, and seals core prints, for both dry and green sand molds. *Whitehead Brothers Co.*

For more facts, circle No. 917 on p. 18

Rental Plan

Bulletin describes rental plan which offers a complete range of new electronic Induction Heating Generators with outputs ranging from 1 to 50 KW. Rental rates with or without option to purchase run from \$14.78 to \$236.25 per month, based on a six year lease. *Induction Heating Corp.*

For more facts, circle No. 918 on p. 18

Magnetic Pulley

Bulletin PY-260 describes and illustrates the Homer Hercules Permanent Magnetic Pulley applications and features. The bulletin includes diagrams, performance data, specifications and a guide for selecting proper size. *Homer Manufacturing Co.*

For more facts, circle No. 919 on p. 18

Crane Cab Conditioning

Bulletin AC-549 gives briefly and accurately the whys and wherefores of crane cab air conditioning. Describes the split system Aire-Rectifier and the self contained units. Many new and exclusive features of the Aire-Rectifier are shown for the first time. *Lintern Corp.*

For more facts, circle No. 920 on p. 18

Blast Cleaning

Bulletin No. 227 begins with a description of the Rotoblast system which uses the principle of controlled centrifugal force for its blasting power. Carefully developed line drawings and cut-away views illustrate the construction features of the unit. *Pangborn Corp.*

For more facts, circle No. 921 on p. 18

SYMBOLS

OF A MONEYSAVING REVOLUTION

Just a few short years ago, *both* parts of the illustration above would have seemed sheer fantasy. But that cross-section picture at the left is today a reality, visible evidence of *why* refractory strainer cores are being used for more and more castings.

Note the clean, sharp lines where the molten metal has passed through the strainer core. Here is *proof* that Louthan Refractory Cores give you closer control of the metal. They also keep slag and core-sand inclusions out of castings, save needless grinding and rejects, often eliminate the need of elaborate and costly gating systems.

Today, Louthan Refractory Cores are used in the making of nearly a *million* castings a month. They withstand 3,000° F. temperatures without spalling or disintegrating. They are exceptionally uniform, dimensionally accurate, easy to handle and use.

If you haven't yet tried these moneysaving *refractory* cores, we invite you to do so. Standard sizes range from 1¾" to 3½" in diameter, while special sizes and shapes can be made for your specific requirements. Why not give them a trial?

Louthan REFRACTORY STRAINER CORES

Louthan Mfg. Co., East Liverpool, Ohio (Subsidiary of FERRO Corporation)

REPRESENTATIVES: FREDERIC B. STEVENS, INC., 1800 18th St., DETROIT 16, MICH.; 93 Stone St., BUFFALO, N. Y.; 36 Shelby St., INDIANAPOLIS 7, IND.; P. O. Box 1716, NEW HAVEN, CONN.; 41 Dovercourt, TORONTO 1, ONT., CAN.; 1262 McDougall St., WINDSOR, ONT., CAN. **FOUNDRY SUPPLY CO.,** 5009 Excelsior Blvd., MINNEAPOLIS 16, MINN.

Letters to the Editor

Letters should be addressed to American Foundryman, Golf & Wolf Roads, Des Plaines, Ill. Letters must be signed but will be published without signature on request.

CO_2 Licensing Agreement

I would like to have more information on the article *"Carbon Dioxide Process for 'Baking' Molds and Cores"* published in the September 1954 issue of AMERICAN FOUNDRYMAN (pages 46-49). I am interested in the licensing agreement.

CHRIS FEUCHT
National Rubber Machinery Co.
Akron, Ohio

The man who developed the process and who is in a position to make licensing arrangements is: Dr. Ing. Waldemar Schumacher, Concordiahutte G.m.b.H., Bendorf-Rhein, Postschliessfach 71, Germany. —EDITOR.

It's Easier with a Nomograph

I have read W. W. Dodge's interesting article "How to Design an Exhaust System" published in the August issue of the AMERICAN FOUNDRYMAN.

On page 55, under the subtitle "Step 17" Mr. Dodge writes: "Therefore, where we have a total pressure value for an exhaust system we may find the correct static pressure on which we can select a fan by subtracting the velocity pressure corresponding to the velocity at the discharge of the system to the atmosphere."

That is correct but what I believe is not correct is the way he finds the total pressure value. He works with velocity pressures and adds to the friction and dynamic losses one duct velocity pressure to the find the total loss. That entrance velocity pressure, as C. Harold Berry states on page 91 of the June 1953 issue of *Heating and Ventilating*, "is set up at the expense of the static pressure of the atmosphere"; that is not a resistance overcome by the fan.

I think the error would be apparent if, instead of expressing resistance in terms of velocity pressure, inches of water were used. Velocity pressure is always positive but total and static pressures may be negative and in an exhaust system they are negative. The total pressure absolute value for a point in the fan inlet duct is smaller than the static pressure absolute value by the amount of the velocity pressure for that point; e.g., if the total pressure is —5 in. of water and the velocity pressure is equivalent to 1 in. of water, the static pressure is equal to —6 inches of water.

The total pressure for a point is equal to the static pressure for that point plus the velocity pressure for that point; but the fan total pressure is the rise of pressure from the fan inlet to the fan outlet as measured by two impact tubes, corrected for friction to the fan inlet and outlet, respectively. The fan static pressure is, by definition, the total pressure diminished by the fan velocity pressure at the fan outlet area.

Then in an exhaust system (assuming there is no outlet duct) the losses to be computed, the losses that are overcome by the fan are—on the inlet side of the fan: pressure loss for entrance to duct and all the friction and dynamic losses to the inlet of the fan, but they do not include the duct velocity pressure. The addition of these losses gives the total system resistance up to the inlet of the fan and this value is equivalent to the fan static pressure.

If we want to know the fan total pressure we must add to the fan static pressure the value of the velocity pressure at the fan outlet. That velocity pressure is lost and cannot be recovered. Besides Mr. Berry's cited article, on page 200 of *Fan Engineering*, fifth edition, there is some information that coincides with my own point of view.

According to N.A.F.M. and A.S.M.E. standard test code for fans, fans are rated according to what I have previously explained because the total pressure in the fan inlet duct is measured by an impact tube and the absolute value obtained is one velocity pressure smaller than the static pressure because static pressure and velocity pressure have opposite signs and we have an algebraic addition.

If a fan would be selected according to Mr. Dodge, it would be, in general, bigger than is required.

The difference between my point of view and that of Mr. Dodge is that he assumes that the velocity pressure at the inlet is set up at the expense of the fan and I contend that it is built up as a conversion of atmospheric pressure into velocity pressure.

The same misinterpretation that Mr. Dodge made is also made by J. L. Alden in his book *"Design of Industrial Exhaust Systems*, Philip Drinker and Theodore Hatch in their book *Industrial Dust*, and Allen D. Brandt in *A Summary of Design Data for Exhaust Systems* published in May 1945 in *Heating & Ventilating*. I think that this mistake originates in the expression of resistance in terms of velocity pressure. I believe that there is no advantage in that procedure and that the standard unit of inches of water should be used.

I am sorry I was unable to send this letter at an earlier date and I will appreciate Mr. Dodge's comments because I think that this discussion should be straightened out before the new AFS book ENGINEERING MANUAL FOR CONTROL OF IN-PLANT ENVIRONMENT OF FOUNDRIES is published.

MIGUEL ANGEL PUCCI, *Met.*
General Foods Corp.
New York

Thank you for your interest in the work being done by the American Foundryman's Society. With the great volume of work being done, debate provoked by interest such as yours is an important factor in ironing out inconsistencies.

We cannot argue that the total pressure involved in moving a fluid is an algebraic summation of those changes in energy level which must be created to overcome the various resistances to flow and to cause a mass of fluid to move. This we have considered and included in the subject paper.

We would debate, however, the advantage of expressing a change in energy level by one standard over another. It is hazardous indeed for those uninitiated to the engineering world to deviate from energy terms in dealing with fluid flow. In the complete treatise on exhaust systems to be published in manual form by the American Foundrymen's Society the conversion from ft-lb/lb to inches of water is explained and the term *inches of water* defined to permit its use. Also, there is an explanation of the conversion of all energy terms into equivalent values expressed in terms of velocity pressure referred to the velocity of the fluid flowing.

By use of velocity pressure terms a summation of terms is more readily accomplished since an approximately linear logarithmic relationship exists between the pressure drops involved in piping and the flow velocity, and a linear relationship exists between velocity of flow and changes of energy level due to gravitational and potential effects. A summation, therefore, may be made without individual conversion of terms. A review of data available in the literature indicates that most losses other than that due to friction losses in piping are expressed in terms of velocity pressure. We have filled in the gap by offering friction drop values in the same terms by use of the nomograph.

In reply to your second point, we feel that to ignore the energy required to cause a fluid mass to move from one energy level to another would be a violation of the first law of thermodynamics which is mathematically expressed by the general energy equation for steady flow. To express the theory more simply would be to say that a mass of fluid at rest regardless of its environment must have energy imparted to it in order to cause it to gain or lose energy relative to its initial level.

Ignoring entropy and the friction losses to surrounding like media, the energy required to do this is equal to

$$\frac{W}{2g}(V_2^2-V_1^2).$$

This is the value we have considered in adding one (1) velocity pressure to our summation.

I sincerely hope this answers your respected review and it would be our wish that if further debate of the subject is required for mutual agreement that this could be done prior to formal publication of the manual.

W. W. DODGE, *Member*
AFS Safety, Hygiene & Air
Pollution Control Committee

continued on page 24

IN ABRASIVE COSTS

using Wheelabrator® Steel Shot

at Ace Sandblast Co. Chicago, Illinois

Here's how you can obtain the lowest possible overall cleaning costs. Switch to Wheelabrator Steel Shot for all your blast cleaning operations. Make savings like those experienced at Ace Sandblast Co., a Chicago job cleaning shop:

Since switching to Wheelabrator Steel Shot abrasive costs have been slashed 80%, and machine maintenance costs drastically reduced, with a remarkable improvement experienced in cleaning time and surface appearance. Overall savings in one year's time enabled them to purchase their fourth Wheelabrator machine.

Hundreds of other satisfied users have experienced exceptional cost savings with this high carbon, heat treated steel shot designed exclusively for shot blasting operations. If you want to reduce your cleaning costs, switch to Wheelabrator Steel Shot. Write for Bulletin 89B for the complete story.

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AMERICAN WHEELABRATOR & EQUIPMENT CORP. 630 S. Byrkit St., Mishawaka, Indiana

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Letters

continued from page 22

Thank you for your reply to my comments on your article in the AMERICAN FOUNDRYMAN.

I still think that it is more convenient to express the pressure losses in inches of water than in terms of velocity pressure. You write that "a review of data available in the literature indicates that most losses other than that due to friction losses in piping are expressed in terms of velocity pressure." I have three objections to this:

1. In general all the friction losses constitute the main part of the total losses for a system and the *A.S.H.V.E. Guide* publishes charts that give the friction losses in inches of water. If the losses are to be expressed in terms of velocity pressure a second step is involved.

2. All the dynamic losses can be readily found in inches of water using a formula of the

$$H_v = C\left(\frac{V}{4005}\right)^2$$

type (*A.S.H.V.E. Guide,* 1954, page 705).

I do not see the advantage of expressing these losses in feet of fluid flowing.

3. I think that the A.S.H.V.E. is the leading authority on these problems and if the *A.S.H.V.E. Guide* expresses the losses in inches of water I do not believe, unless we have very good reasons, that we should use other units.

On the reply to my second point I think that you have misinterpreted my statements. I have considered the first law of thermodynamics because I do not state that no energy is required to cause a fluid mass to move. What I am stating is that in the particular case of the inlet duct to a fan, the velocity pressure is "set up as a conversion of atmospheric pressure into velocity pressure (my letter of November 8). In other words, the atmospheric pressure forwards the energy required to set up that velocity pressure and not the fan. In another letter, if you want, we can discuss the work done by the fan.

On page 19 of Bulletin No. 110, second edition, of the National Association of Fan Manufacturers, Inc., a sketch shows the way in which fans are tested. According to it, the measured absolute value of the total pressure at the inlet duct is one velocity pressure smaller than the value suggested in your article and as fans are rated according to N.A.F.M. standards, in buying a fan selected following your suggested procedure, it will be bigger than required.

I shall be looking forward to hear your further comments on the subject.

MIGUEL ANGEL PUCCI

I appreciate your efforts in behalf of the *A.S.H.V.E. Guide* since I am a member in good standing of that society; however, I do not consider everything published by A.S.H.V.E. as being dogmatic and omnipotent in presentation. They change their approach to various problems from issue to issue.

Our article using the nomograph rather than the standard friction chart was presented for those who choose to accept it and use it for their design problems. It is a welcome tool for many who work generally with exhaust rather than ventilating systems. With the higher pressures involved in that type of system, we feel the velocity pressure calculation is simpler as it eliminates the need to "back track."

If we have not been able to show you by means of our article how the system of calculation we propose is easier, we are indeed sorry and suggest you obtain a copy of the AFS manual when it is available, wherein a more complete explanation is offered.

With regard to the total pressure question, we do not disagree with N.A.F.M. in their standard test code. They do not disregard the initial one (1) velocity pressure value but are able to leave it out of the calculation by using constant duct sizes. We point out that in many exhaust systems the inlet and outlet velocities vary considerably and should be accounted for in the system calculation. Considering our atmosphere as a vast reservoir of energy is correct but we cannot ignore the fact that to use it we must first create a low pressure area in order to cause the fluid to flow from a high to a low pressure region. To do this some work must be done on the fluid occupying the region where displacement takes place.

Hope this clarifies our intent.

W. W. DODGE

ENGINEERING MANUAL FOR CONTROL OF IN-PLANT ENVIRONMENT OF FOUNDRIES *is being published in sections. Parts on "Exhaust Hood Design" and "Ventilation of Sand Handling Systems" are already available. Entire book will be published this fall. Mr. Dodge is staff engineer in the manufacturing general office of Caterpillar Tractor Co., Peoria, Ill.*

Tear Sheets Gladly Sent

Please supply a free tear sheet of the article *"Anybody Can Simplify Work"* by Milton E. Annich (AMERICAN FOUNDRYMAN, November 1954, pages 48-51).

A. G. DEEMING, *Research Met.*
Staveley Iron & Chemical Co. Ltd.
Hollingwood, England

Kindly send tear sheets for the article in the December issue (pages 41-43) by Joseph L. Brooks entitled *"Holding Blast Humidity Constant."*

F. P. GILLIGAN, *Sec.-Treas.*
Henry Souther Engineering Co.
Hartford, Conn.

Please send tear sheets of the article *"Coercive Force: Possible Measure of Degree of Malleablization"* by D. S. Eppelsheimer and D. S. Gould that appeared on pages 41-43 of the November 1954 issue of AMERICAN FOUNDRYMAN.

J. J. BRENZA, *Staff Metallurgist*
Koppers Company, Inc.
Baltimore, Md.

NATIONAL PITCH-RESERVOIR NIPPLES*

TRADE-MARK

THE NEW PITCH-RESERVOIR NIPPLE, an exclusive "National" product, is another major contribution by National Carbon Company to more efficient electric furnace operation. You can now be sure that tight joints will stay tight under normal load and service conditions.

"NATIONAL" PITCH-RESERVOIR NIPPLES, designated Type PR-F, are now available for electrode diameters from 14" to 24". Thoroughly proved in service, they are identical in strength, size, shape, tolerances, composition and quality to our standard, tapered, graphite nipples. Talk it over soon with your National Carbon Company electrode representative.

***PATENTS PENDING**
EXCLUSIVE DESIGN

HERE'S HOW IT WORKS:

Reservoirs near each end of the nipple contain pitch. As the electrode column becomes hot in service, the pitch flows from the reservoirs into the threaded sections of the joint and cokes out, cementing and locking the threads of the nipple and sockets together.

FOR ELECTRODES AND ELECTRODE SERVICE...
Rely on NATIONAL CARBON COMPANY!

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Sales Offices: Atlanta, Chicago, Dallas, Kansas City, Los Angeles, New York, Pittsburgh, San Francisco. *In Canada:* Union Carbide Canada Limited, Toronto

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Foundrymen in the News

Victor L. Persbacker has been elected comptroller of American Brake Shoe Company, New York. **Rush M. Forquer, Jr.** and **Wendell P. Kessler** were elected assistant comptrollers. Mr. Persbacker succeeds **Edward C. Hof,** who is retiring after 51 years with the company.

Miss Gerteis has retired from Archer-Daniels-Midland Co., Cleveland. **Ray Adams** has taken over her position of handling the order department for the Chemical Products Div., and he will also handle the orders and shipments for the Foundry Products Div.

Henry B. Hanley has retired as foundry manager of American Laundry Machinery Co., Rochester, with which he has been associated for the past 25 years. Before joining American Laundry Machinery Co., he was chief metallurgical chemist with Saunders and Franklin, Providence, and held positions as metallurgist and consultant for several other companies on the East Coast. Mr. Hanley was a national director of American Foundrymen's Society from 1937 to 1940, and was the founder and first president of the Rochester Chapter of AFS. He prepared the first American Exchange Paper to the International Foundry Congress in Paris in 1922.

Mr. Hanley was a student of Dr. Richard Moldenke and succeeded the doctor in pioneering sand research and technology in this country. He was the creator of the Hanley patent on production of synthetic molding sands, and traveled extensively in the eastern states speaking and demonstrating foundry sand testing and control methods.

Mr. Hanley has been a director of Gray Iron Institute, and a vice-president of Meehanite Research Association of America, Inc. During World War I he served as a consulting metallurgist to four top war plants.

Robert R. King has been promoted to vice-president and general manager, Paxton-Mitchell Co., Omaha. **Christian H. Petersen** has been named sales and service manager.

Robert H. Williams recently joined General Metals Corp., San Francisco, as industrial relations director. Mr. Williams will counsel on and coordinate the various divisional industrial relations programs within the General Metals Corporation.

Gordon McMillin has joined Canadian Car and Foundry Co., Ltd., Montreal, Quebec, as assistant vice-president. He will be in charge of foundry operations at the Longue Pointe Plant.

Daniel C. Guldner joined Pennsylvania Electric Steel Castings Co., Hamburg, as superintendent of cleaning and finishing shops.

Chester E. Ault has been appointed assistant sales manager for Link-Belt Company's Pershing Road Plant in Chicago. He succeeds **Andrew K. Kolar,** who has been named purchasing agent for the same plant.

Frederick W. Merry has been appointed sales engineer of the Foundry Div., Union Metal Manufacturing Co., Canton, Ohio.

Lewis F. Herron, president of James H. Herron Co., Cleveland, has been elected president of American Council of Independent Laboratories, Inc.

Hjalmar Nilsson has been appointed chief engineer of Magnesium Company of America. **Eugene Gailmard** was appointed administrative assistant to Mr. Nilsson.

Jay W. Kent recently joined Davis Fire Brick Co., Oak Hill, Ohio, as sales engineer.

Raymond Shile has been appointed manager of the new eastern sales office of Palmer-Shile Co., New York.

Herbert B. Gausebeck has been promoted to manager for program development at Armour Research Foundation of Illinois Institute of Technology, Chicago.

David J. Blythe has been appointed production superintendent, metals manufacturing, National Lead Company.

B. C. Robertson, has been named district sales manager for Lone Star Steel Company's Houston office.

James B. Morey has been appointed in charge of the Cincinnati Technical Field Section, Development and Research Div., International Nickel Company, Inc., and **William S. Mounce** has joined the division's staff in New York City as a member of the Constructional Alloy Steel Section.

H. T. Coghill has joined the sales staff of the Refractories Div., Carborundum Co. and is working in the Cincinnati territory.

James J. Offutt has been appointed manager of domestic and Canadian affiliate companies, A. P. Green Fire Brick Co., Mexico, Mo. **W. G. Twyman** succeeds Mr. Offutt as general manager of the Toronto Div.

Bernard Schneider has been promoted to chief engineer for the Conveyor Equipment Section, Chain Belt Co., Milwaukee.

Frank B. Powers was elected vice-president and sales manager, Burnside Steel Foundry Co., Chicago. **James L. Jackson** was appointed assistant sales manager, and **Joseph E. Egan** was appointed assistant to the president.

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H. B. Hanley . . . retires

R. R. King . . . promoted

C. H. Petersen . . . sales mgr.

R. H. Williams . . . coordinator

J. F. Wallace . . . joins C.I.T.

W. S. Pellini . . . honored

D. Burgan . . . added to staff

Dr. Rice . . . with Elect. Steel

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J. F. Wallace, who has recently been appointed professor of metallurgical engineering, Case Institute of Technology, Cleveland, is the author of the official exchange paper to the French Technical Foundry Association. The title of Mr. Wallace's paper is "Shell Molding Process Development at Watertown Arsenal." Previous to his position at Case Institute, he was the director of Rodman Laboratory, Watertown Arsenal, Watertown, Mass. George J. Snyder, metallurgist, Rodman Laboratory, assisted Mr. Wallace in assembling information and preparing the paper for publication. Mr. Wallace is a member of the Northeastern Ohio Chapter of American Foundrymen's Society, a member of American Society for Metals, and New England Foundrymen's Association. He has written numerous articles which appear in *AFS Transactions*.

James W. Higley has been appointed sales engineer for Davenport Machine & Foundry Co., Davenport. Prior to his appointment, he was the foundry engineer for Mechanical Handling Systems, Inc., Detroit.

Dean Burgan and **Dr. William H. Rice** have recently been added to the technical staff of Electric Steel Foundry Co., Portland, Ore.

Cyrus E. Brush has been elected vice-president of American Brake Shoe Company. **Alfred H. Munkenbeck, Jr.** was named secretary and **William J. Foster, III**, assistant secretary.

Joseph L. Ballash, chief engineer of Sterling Grinding Wheel Co., Tiffin, Ohio, has retired. Mr. Ballash has been with the company for 32 years, and will continue his association with them in a consulting capacity.

Harry C. Platt has been elected executive vice-president of the Engineered Castings Div., American Brake Shoe Co., Rochester.

Norris H. Schwenk has been appointed general manager of Baldwin-Lima-Hamilton Corp., Philadelphia, and **James J. Nelson** was appointed sales manager of its Foundry Dept.

Fred W. Fisher has been appointed manager of the new sales office of Whiting Corp., Charlotte, N. C., and **Harvey K. Waters**, formerly working out of Birmingham, has been assigned to Mr. Fisher's staff. **T. L. Iwan** has been assigned to the Ardmore district office in Philadelphia as sales engineer, and **A. H. B. Stensland** has been assigned to Whiting's district sales office in Pittsburgh.

W. S. Pellini has been selected by the Board of Managers of the Washington Academy of Sciences to receive the 1954 Award for Scientific Achievement in the Engineering Sciences. The award was granted "in recognition of Mr. Pellini's notable contributions in the field of metal processing".

Frank T. Hamilton was re-elected president of Cast Iron Soil Pipe Institute. **Philip J. Faherty** was re-elected vice-president, and **Deems W. Hallman** was re-elected treasurer. Elected as directors were: **M. J. Harvey**, **L. Worth Little**, and **Joe H. King, III.**

H. Norbert Kirchdorfer has been appointed regional sales manager for Reynolds Metals Co. in the central region.

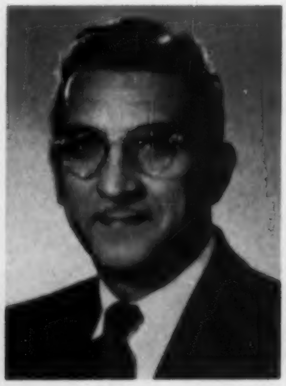
Leo J. Gardner has been appointed Ohio sales representative for Newaygo Engineering Co., Newaygo, Mich. He will cover all but the northeastern section of Ohio.

T. W. Kuhn was elected executive vice-president of Bohn Aluminum & Brass Corp., Detroit. **C. M. Adams** was elected vice-president, and **E. K. Mann, Jr.** was elected vice-president and treasurer. **W. J. Lane** was elected secretary.

Gilbert Hilbrant and **R. B. Dietsche** have been appointed to the Chicago sales staff of Syntron Chicago Sales Co.

H. K. Waters . . . moved

A. H. B. Stensland . . . to Pittsburgh



T. L. Iwan . . . to Ardmore

F. W. Fisher . . . new manager

C. J. Becker's CONFIDENCE IN SIMPSON PAYS

● They haven't bought a new mixer at Union Brass & Mfg. Company since the late 30's . . . but Vice President C. J. Becker's satisfaction and confidence in the performance of their two Simpson Mix-Mullers helped this leading St. Paul, Minnesota foundry boost their production on household and commercial plumbing fixtures by 20%.

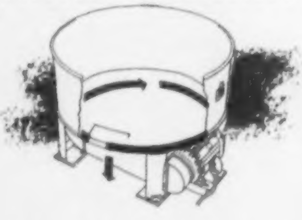
Purchased in 1938, Union's first Mix-Muller was used for facing sand until 1953. In 16 years they have replaced *one* reducer. Repairs have been minor and the original mullers are just now beginning to show signs of wear. It was satisfaction with this machine and confidence in the National people who sold it, serviced it, and discussed foundry matters with Mr. Becker that brought about the NATIONAL designed and built mechanized shop shown at right. With it, production is up 20% . . . their all-mulled sand has brought about definite improvements in casting quality and lower rejects. Improved working conditions have paid off in safety, high morale and expedient service to customers.

The Union Brass story is typical of the type of confidence on which National Engineering Company service is based.

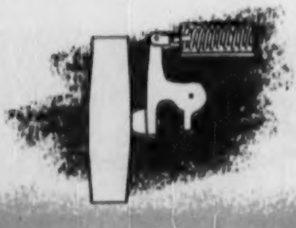
YOUR NATIONAL AGENT . . . a single source for foundry planning

Your "man from National" is more than a mixer salesman. He's backed by over 40 years of practical design, engineering and operating foundry experience. The service which he represents touches every phase of foundry practice. The benefit of his experience and his company's experience in engineering, in sand practice, in sand and mold handling, design and erection . . . is a valuable asset to your future planning.

MORE AND BETTER SAND FOR EVERY DOLLAR INVESTED



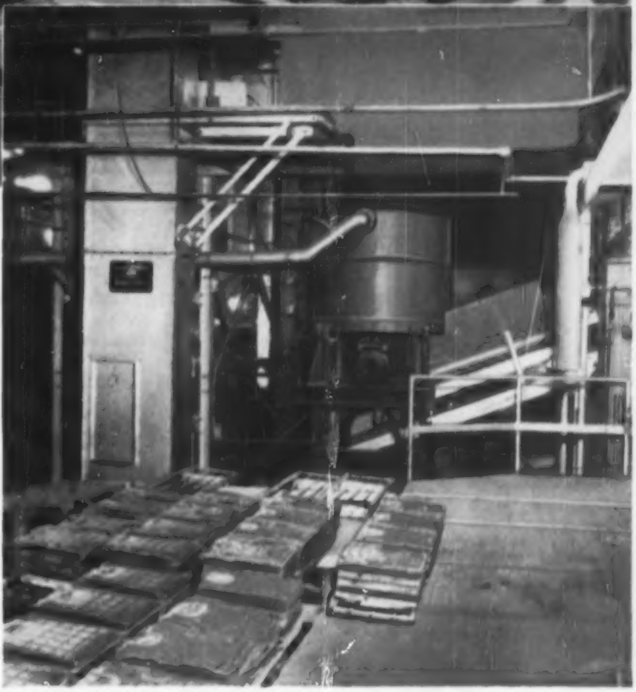
The new F Series Mix-Mullers are now available in batch capacities designed for every foundry requirement. Based on the simple, rugged and dependable bottom discharge principle where all power is used to mull, the Simpson Mix-Muller assures low maintenance, longer life and incorporates many new features designed to make mulling easier . . . sand control more positive.



MAXIMUM MULLING where and *when* you need it

Designed to transmit variable muller pressure to the sand bed through mullers of comparatively light initial weight, spring-loaded mullers permit maximum muller pressures to build up—as the sand increases in strength during mulling. This is your assurance of positive control over mixes from the slickest core sands to the toughest steel sands . . . at the turn of a wrench.

20% PRODUCTION DIVIDEND FOR UNION BRASS



SPECIAL INCLINED PALLETS SERVE UNION BRASS

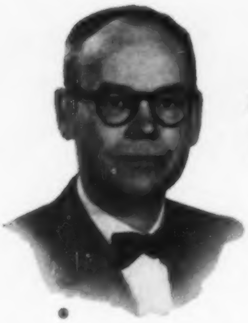
Uniform metal shrinkage, ease of pouring and no manual handling of molds is assured by this National engineered inclined pallet system. Semi-automatic weights permit positioning of individual weights on multiple mold pallets. One man shifts all molds and sets weights . . . one man handles shakeout. Overhead storage at molders stations, batch hoppers, conveyors and elevators handle all sand mechanically.

STEADY FLOW OF ALL-MULLED SAND FROM THIS SYSTEM

New mechanized system at Union Brass eliminates facing and floor heaps. Sixteen-year-old Simpson Mix-Muller delivers top quality sand for 40-43 molds per man per hour on two shifts daily.

National Engineering Company
(Not Inc.)
630 Machinery Hall Bldg. • Chicago 6, Illinois

PRODUCTS OF A PRACTICAL FOUNDRYMAN



Talk of the Industry

TRUE CENTRIFUGAL CASTING OF TITANIUM has been achieved by Wisconsin Centrifugal Foundry, Inc., Waukesha, Wis., in conjunction with Armour Research Foundation, Chicago. The company's new process is first to turn out a continuously uniform quality product according to M. E. Nevins, president. Jack W. Giddens of Armour points out that costs and production time for casting are greatly reduced in comparison to forging. Present equipment now able to handle castings up to 10 lb will be supplemented by a furnace able to produce 50-lb castings, reports Paul J. Schneider, vice-president of Wisconsin Centrifugal.

NOT GUILTY! Industry is not to blame for smog in Los Angeles County—nor are smudge pots, automobile exhaust, incinerators, etc.—according to Stephen E. Blewett, writing in Fortnight, Los Angeles publication. Trouble is due to ozone from the stratosphere over the Pacific and nitrogen dioxide of meteorological origin. Condition has always existed, he states, and cites the name "Bay of Smokes" given to San Pedro Bay in 1542 . . . and an 1868 Los Angeles newspaper report: "It is now about six days that we have in this and the surrounding country been spectators of an unusual atmospherical phenomenon . . . the atmosphere has been so filled with smoke as to confine the vision within a small circumference . . ." Solution, Blewett writes, lies in development of a catalyst or neutralizer that will destroy or precipitate the poisonous mixture of nitrogen dioxide and ozone.

HOTEL RESERVATION BLANK for the 1955 AFS Convention in Houston, May 23-27, will be found with a map of downtown Houston and a condensed program of sessions and special events on pages 50-53. Conventioneers are urged to fill in and send promptly to AFS Housing Committee, PO Box 5146, Houston 12, Texas. Blanks will not be mailed direct to the foundry industry as in previous years.

HIGH RESISTANCE to impact and abrasion are features of a new type of alloy steel developed by American Steel Foundries, East Chicago, Ind. Initial hardness in sections up to 6 in. is 470-520 BHN (only slightly lower in thicker sections). Other properties: TS, over 220,000 psi, and YP, over 180,000 psi, from 450 F to -50 F; Charpy impact, about 20 ft-lb. Called Wearpact, the steel can be arc-welded, is machinable (use heavy duty equipment or grind), is magnetic, and can be differentially hardened. The new steel casts without difficulty; special patterns are not required. Wearpact dipper teeth are reported to have outworn other alloys 3 to 1.

MODEL WORKMEN'S COMPENSATION LAW will be developed early this year by the U.S. Department of Labor and submitted to the 44 states having compensation laws with the suggestion it be adopted, according to W. N. Davis, AFS safety, hygiene, and air pollution control director. Broadened law includes more types of accidents and diseases, and increases payments on types now covered.

Herbert F. Scobie

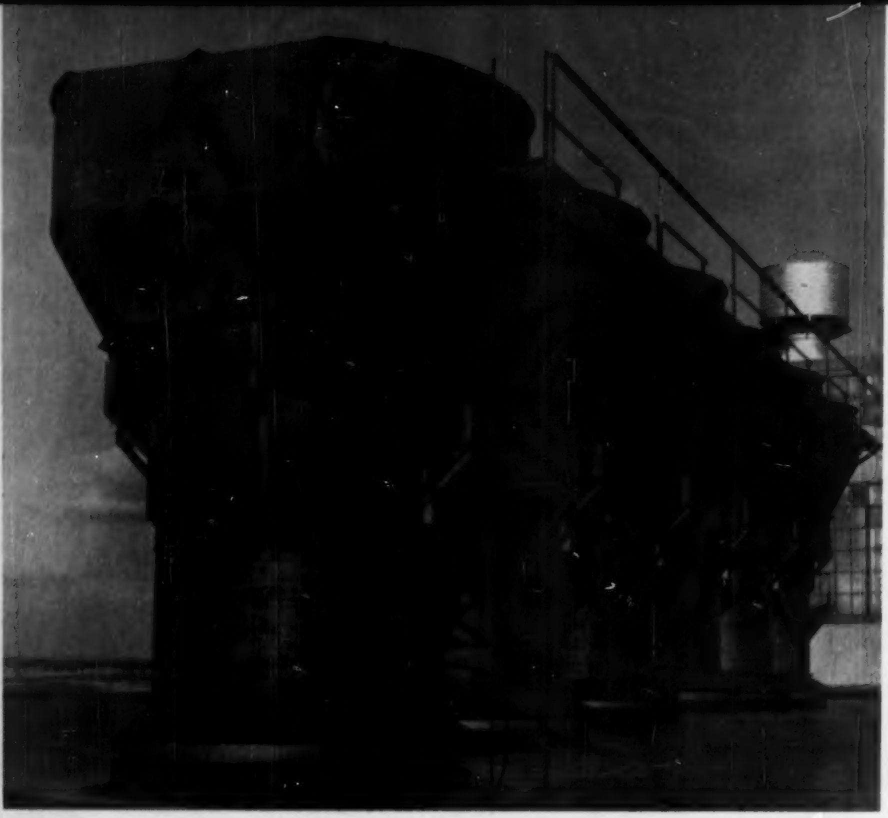


Fig. 1 . . Six cupolas fitted with gas scrubbers; note maintenance walkway, flat shell side, and the gravity drain below the shell.

O. J. Brechtelsbauer / *Engineer*
Chevrolet Saginaw Gray Iron Foundry
General Motors Corp., Saginaw, Mich.

Cupola Gas Scrubbers

Wet gas scrubbers provided an economical answer to a cupola emission problem. The story is one of 95 covering the entire field of foundry technology appearing in volume 62 of *AFS Transactions*.

■ About 1949 an organized effort was begun by the American Foundrymen's Society, air pollution control authorities, and equipment engineers and manufacturers to analyze and control cupola emission. However, long before the Donora incident and the Los Angeles County Code at least one General Motors foundry recognized that a serious problem existed, and in line with the progressive attitude of the corporation, decided to install equipment to reduce emissions from its cupolas.

In 1938 the Buick foundry at Flint, Mich., installed a wet cupola gas scrubber on one of its 96-in. cupolas. In 1945 this unit was rebuilt and duplicate collectors were installed on the remaining five cupolas. Although no test data are available, the installation was considered successful from the standpoint of reduced fly ash deposit on adjacent roofs and grounds. Later in 1945 six similar collectors were installed at the Saginaw Malleable Iron Plant of Central Foundry Div. at Saginaw. In 1947 the six new cupolas installed at Chevrolet Saginaw Gray Iron Foundry as part of a post-war expansion program also were similarly equipped (Fig. 1) at a cost of almost $25,000 although the City of Saginaw has no ordinance requiring that such equipment be provided. That no ordinance has been passed by Saginaw, although the world's largest gray iron foundry as well as the world's largest malleable iron foundry are located there, can perhaps be attributed mostly to the fact that both foundries have themselves recognized the importance of air pollution control and have installed effective equipment.

The scrubbers as originally installed at Chevrolet Saginaw Gray Iron by a local iron works were an exact copy of the 1945 Buick installation. The units (Fig. 2) consisted essentially of a double cone with 70 sprays

evenly spaced about its base. The cone with the nozzles was suspended within a 1/4-in. plate shell or shroud which extended down to form a trough about the cupola just below the top rim. The trough was sloped toward a 6-in. drainage pipe through which the spray water with the collected material was carried to the base of the cupola. There it was again used to quench and convey the slag to the slag disposal system. The upper or large section of the shell is not round but has flat sides (Fig. 1) because the 12-ft center distance of the cupolas restricts the 13½-ft diameter shell.

The sprays with a 5/32-in. orifice were directed downward and outward toward the shell so that the hot dust-bearing gas rising up between the cone and the shroud came in contact with the water. Water was supplied by a 3-in. pipe to the apex of the double cone forming a pressurized chamber supplying water to the nozzles. A 500-gpm pump supplied the water to the cone inlet at a pressure of 18 psi. This pump capacity was equally divided among three cupolas operating simultaneously.

The cupolas were placed in service in June 1948. On the first day of operation, the blast on No. 18 cupola was turned on before the pump supplying water to its collector unit could be started. The result was that the cone of the scrubber became thoroughly heated and when water finally entered the chamber between the cones the resulting steam built up enough pressure to pull one of the stays out of the lower cone forcing a steady stream of water down into the cupola stack. Water to the unit could not be cut off for fear of further damage to the cones which would certainly have made replacement necessary, so the bottom on this cupola was dropped and operation discontinued.

This unfortunate experience was an important factor in discarding the hollow cone multi-spray arrangement. In addition, frequent cleaning of the spray nozzles led first to the reduction in the number of nozzles and finally to the adoption of the present single nozzle and cone arrangement. The difficulties with the multi-sprays were attributed mainly to dirt, pipe scale, and boiler scale in the mill water being supplied to the sprays. Boiler scale was formed within the hollow cone of the scrubber unit itself and became dislodged by the alternate expansion and contraction of the cones. All nozzles were inspected daily, and about once a week the nozzles were removed and the pipes and cones were thoroughly flushed to remove as much of the accumulated dirt and scale as possible. With 432 nozzles in all, it is obvious that cost of maintenance was prohibitive.

Cleaning time and frequency was reduced somewhat when the orifice size in the nozzles was increased to 7/32-in. and the number of nozzles was reduced by one half to 35 in number. The center to center distance of the nozzles now however, was almost 8 in. with very little overlap between the sprays. When one nozzle became plugged, the resulting void in the water curtain was considerable. Even with the larger orifice, frequent cleaning of the nozzles was still necessary and maintenance costs were still considered high, especially when, after about 18 months of operation, the lower cones showed signs of warpage and need for replacement.

In the meantime, McKinnon Industries at St. Catharines, Ont., had a single spray nozzle installation in operation which was effective, yet required considerably less maintenance. Drawings of this arrangement were obtained, and in April 1951, No. 18 cupola at Chevrolet was remodeled into a similar installation (Fig. 3). The change was simple since it required only the removal of the upper cone and nozzles, and the installation of the single large nozzle over the apex of the remaining lower cone. The shell or shroud part of these collectors has not been altered from the original installation made in 1947, except that the overflow size was increased from 2-in. to 5-in. diameter.

During 1951, the remaining five cupolas were remodeled into this single spray arrangement. Figure 4 is a detail drawing of the nozzle and Fig. 5 shows the arrangement of the nozzle supply pipes. Figure 6 shows a detail of the 3/8-in carbon steel cone and the relative position of the nozzle. Effectiveness of the

Fig. 2 . . Sketch of the original double cone scrubber.

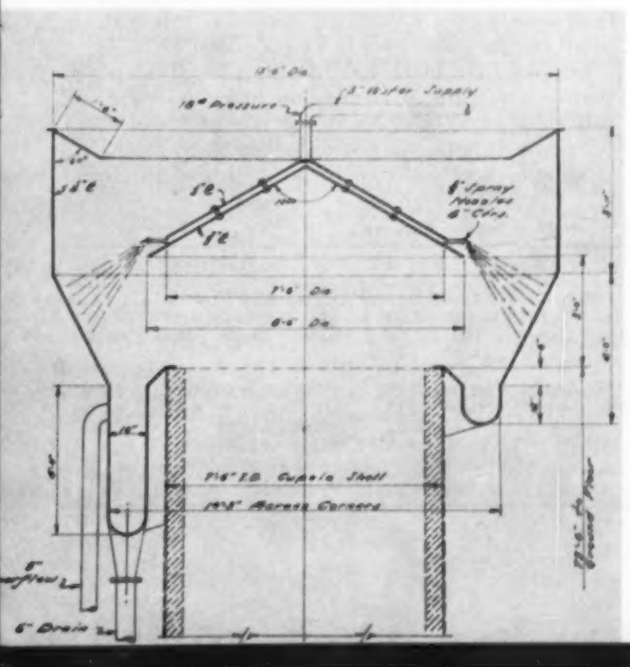
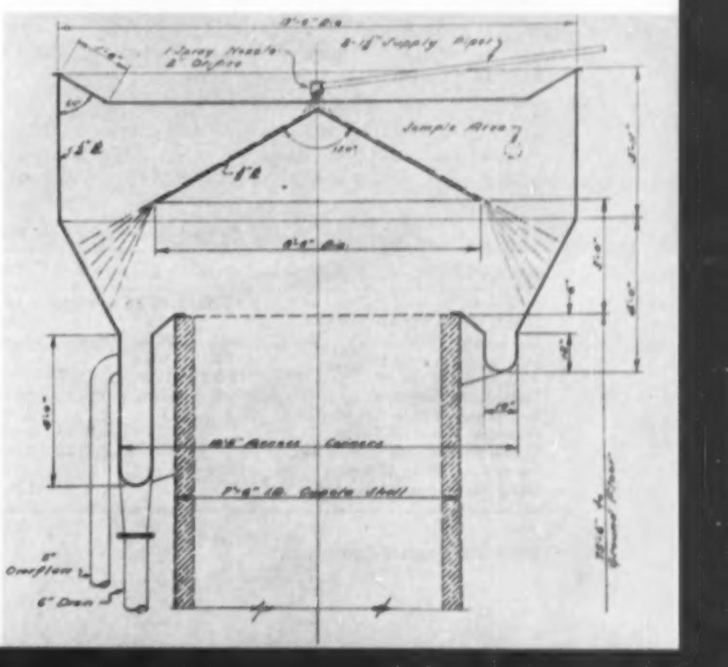
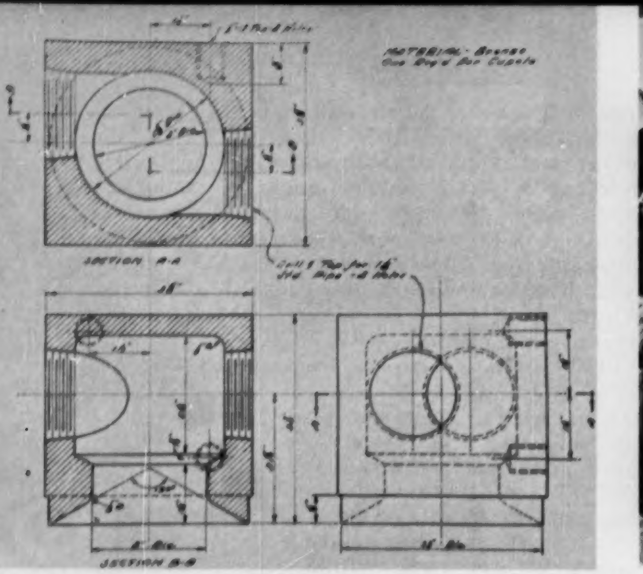


Fig. 3 . . Simplified single cone and nozzle scrubber.





units is attributed mainly to the uniform distribution of water over the entire cone by the nozzle (Fig. 7).

Operation-wise, the present equipment is practically foolproof requiring only the observance of the following rules:

1. Collector water and cupola blast must be turned on simultaneously. If water is turned on ahead of the blast, spillage down the cupola stack will result. If the blast is turned on too soon, cone life is reduced because of the intense heat and consequent warpage. None of the cones has been replaced since installation of the single spray nozzles.

2. No papers, cartons, or rags are to be thrown into the cupolas for disposal. Any light material such as papers or rags would be carried up to the collectors, and if not first consumed by the flames will become lodged in the trough or drain pipe.

Maintenance cost of these scrubbers has been cut to a minimum, each unit averaging less than four man-hour per week. Normal requirements are limited to a general inspection and cleaning of the units. Some patching has been necessary recently on the shells since the effects of corrosion are becoming evident. As previously stated, the shells are still the original, made of ¼-in. plate. Most severe corrosion takes place in the shell area immediately above the water spray where the greatest buildup of mud and fly ash occurs, retaining moisture, continuing the oxidation process even with the unit shut down.

Figure 8 shows the cleanout installed in the drain pipes just above the roof line of the cupola building. While work is being done on a scrubber unit, the plugs are removed and plate deflector is laid over the drain leading from the botton of the cleanout. Any material or object which is then dropped into the drain from the scrubber will be discharged onto the roof rather than become lodged in the drain pipe further below.

Water volumes remain unchanged from the original 470 to 500 gpm which is evenly divided between the two or three cupolas in operation. Water pressure at the cupola building roof line is 20 psi (approximately 18 psi at the nozzle). Water temperature after the collector is approximately 85 F when water supply temperature is 52 F.

On Feb. 11 and 12, 1953, effluent dust loading tests were made on No. 16, 17, 18, and 19 cupola stacks. Twelve samples were made, three on each of the four cupolas. Samples were taken about 2 ft below the top of the collectors (Fig. 3) just above the spray and 18 in. in from the shell. The samples were taken from three different positions (left, center, and right) in the half of the scrubber nearest the walkway. The walkway is located along the west side of the stacks. On Feb. 11, when No. 16 and 18 stacks were sampled, wind direction was from southeast at 12 mph, 31 F, and on Feb. 12, when No. 17 and 19 stacks were sampled, wind direction was from west at 13 mph, 31 F.

Since only two cupolas were in operation, water rates were approximately 235 gpm. Gas temperatures in all test locations were in excess of 500 F.

Samples were taken only during normal operation periods and required 17 min and 40 sec to obtain one half cubic meter samples at the rate of 1 cfm. Two operating cupolas were sampled simultaneously.

Samples were collected in butyl alcohol in Green-

Table 1 . . Emission Test Results of Water-Cone Topped Cupolas

Test No.	1	2	3	4	5	6	7	8	9	10	11	12
Date	2-11-53	2-11-53	2-11-53	2-11-53	2-11-53	2-11-53	2-12-53	2-12-53	2-12-53	2-12-53	2-12-53	2-12-53
Cupola No.	16	18	16	18	16	18	17	19	17	19	17	19
Test Location	Left	Left	Center	Center	Right	Right	Left	Left	Center	Center	Right	Right
Charge, lb (Ave per hr)	42700	45045					47000	46330				
Melt, tons (Ave per hr)	18.3	19.2					20.0	19.9				
Total Grams Collected	0.226	0.249	0.216	0.218	0.255	0.183	0.201	0.258	0.226	0.251	0.232	0.276
Grains per Cu Ft of Gas @ 500 F	0.11	0.12	0.10	0.10	0.12	0.09	0.10	0.12	0.11	0.12	0.11	0.13
Grams on 300-Mesh Screen			0.0012	0.0038					0.0028	0.0025		
Grams Through 300-Mesh Screen			0.2147	0.2144					0.2233	0.2488		
Per cent by Wt on 300-Mesh Screen (Exceeding 40 Microns)			0.6	1.7					1.2	1.0		

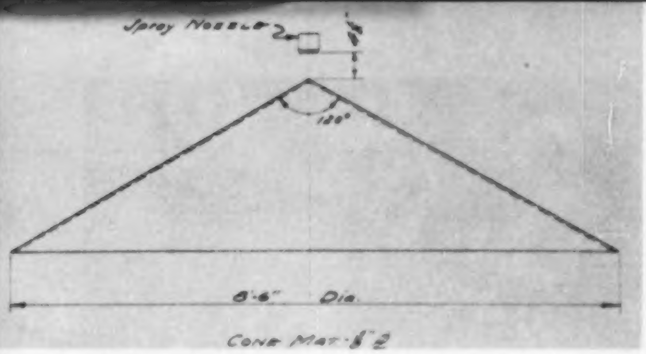


Fig. 4 (Far Left) . . Detail of the single spray nozzle.

Fig. 5 (Left) . . View of scrubber showing piping to the spray nozzle and cone supported from the shell.

Fig. 6 (Above) . . Detail of ⅜-in. steel cone.

burg-Smith impingers. Dust content of the samples was determined gravimetrically and particle size determination was by sieving and microscopy.

The dust loading tests were made by personnel of General Motors Industrial Hygiene Service under the direction of A. Patty. Tests were made at the request of Chevrolet Saginaw Gray Iron Foundry.

Table 1 is a tabulation of the test results. Results of the tests in grains per cubic foot at 500 F, which varied only 0.04 grains, indicate accuracy and reliability. The average of 12 samples is 0.11 grains per cubic foot of gas at 500 F, indicating that the scrubbers are reasonably effective.

As a further check of the performance of the units, an analysis of the particle sizes was made wherein it was found that only about 1 per cent by weight of the escaping particulate matter exceeded 40 microns in diameter. Of the remaining 99 per cent by weight, over 99 per cent of the particles, by count, were found to be less than 5 microns in diameter. These small particles, however, greatly contribute to the visible discharge from the scrubbers which is somewhat lighter in color and less dense than the discharge from cupolas not equipped with collectors.

Conclusion. The scrubbers in use at Chevrolet Saginaw Gray Iron Foundry are the simplest and least expensive available at this time and from the results of the tests, will meet code requirements in many areas of the country.

Variations of these units are being used by many foundries as a stop gap until better equipment can be installed and operated at more reasonable cost. The Buick foundry is presently installing four new 108-in. cupolas which will be equipped with exact duplicates of the gas scrubbers in use at Chevrolet. Because, in most instances, this type of collector can be installed without changes to existing blast equipment, they are especially attractive for installation on existing cupolas. Most important consideration, perhaps, is the center distance where there is more than one cupola to be equipped, as this limits the diameter of adjacent shrouds.

Total cost of the Chevrolet installation, not including water supply, drain, and overflow piping, was approximately $20,400 or about 45¢ per pound installed (1947 price). Cost of maintenance, labor, and materials is estimated to be $8,500 annually for the six units. This is based on a cone and upper shell life of six years and includes the routine weekly maintenance on the units. Cost of maintenance of the water supply pump and system is not included here since this same supply is also used for the slag disposal system.

Fig. 7 (Above) . . Water is distributed uniformly over the entire cone by the single spray nozzle.

Fig. 8 (Above) . . Scrubber drain pipe cleanout trap.

IRVIN R. KRAMER / *Vice-President*
Mercast Corp., New York

Frozen Mercury Patterns

Make Ceramic Shell Molds

Precision ceramic shell molds made from frozen mercury investment patterns provide a way of forming complex shapes with close dimensional tolerances in both conventional and virtually unmachinable alloys.

■ A mercury pattern is made by simply freezing mercury which has been poured into a steel die. In freezing mercury, the same problem is encountered as in the solidification of nearly all molten materials, namely, that of feeding the casting to prevent shrinkage in undesirable places. The die is lowered into a dry ice-acetone mixture at – 100 F so that freezing will progress from bottom to top of the pattern. Since the rate of solidification is easily controlled by the rate of submergence of the die into the freezing bath, directional solidification, insuring continuous feeding, is easily achieved.

When wax or plastic is used for investment casting patterns, it is usually difficult to fill properly sections with thickness ratios greater than 4 or 5 to 1. No difficulties are encountered when filling varying sections

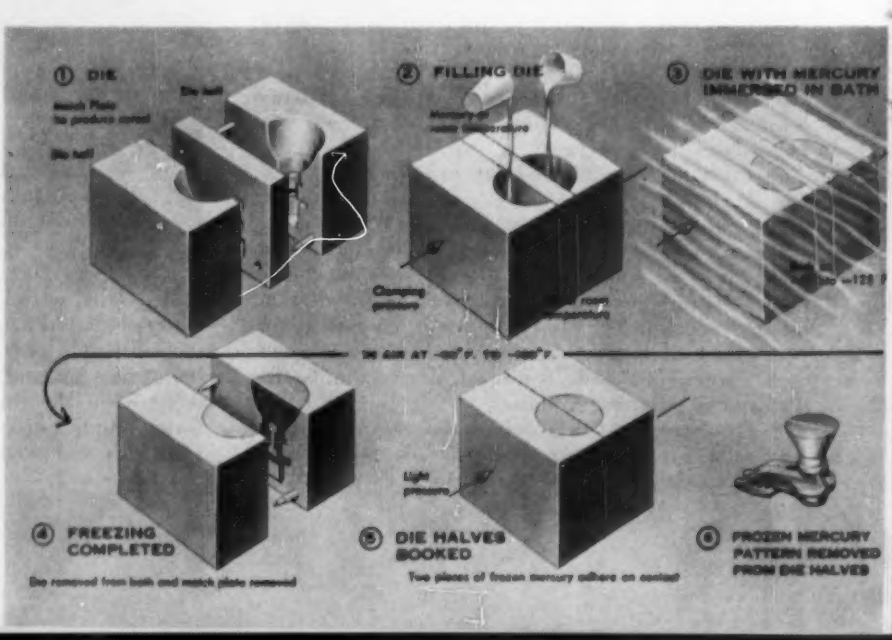


Fig. 1 . . Sequence of operations necessary to form a complete one-piece frozen mercury investment pattern.

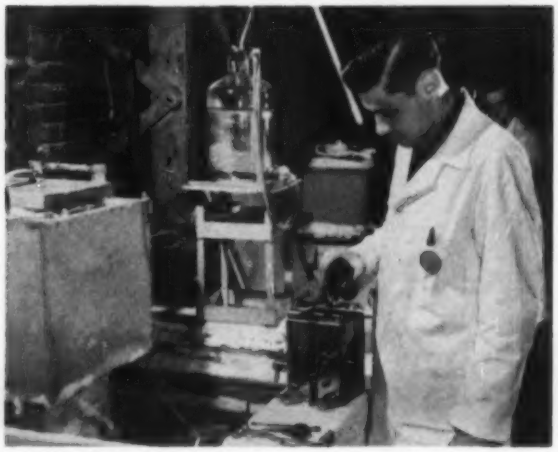


Fig. 2 . . Pouring mercury into a three-piece steel die. Die is then immersed in freezing mixture (—100 F).

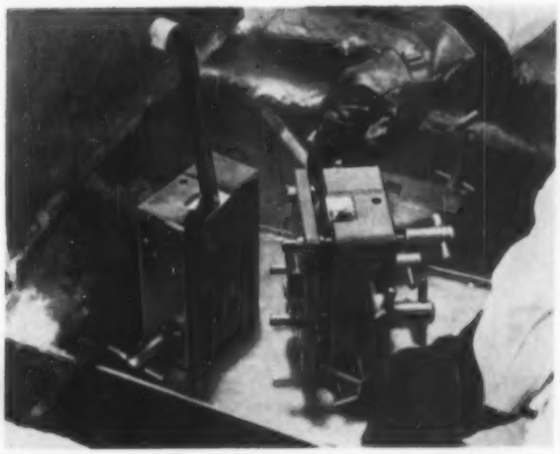


Fig. 3 . . Removing matchplate prior to welding pattern halves by re-assembling the die (note die in bath).

with mercury as its high density causes it to fill the mold completely and reproduce the finest details of the die.

Perhaps the greatest advantage of frozen mercury as a pattern material for investment castings is its weldability which enables patterns to be made of complex shapes. When two pieces of frozen mercury touch with slight pressure the pieces weld together. This ability for self-welding is exploited advantageously with booking dies to produce and assemble mercury patterns with complex internal passages and undercuts.

In principle, a booking die is composed of three sections, although in practice it may contain as many sections as are necessary to make a desired pattern. The die consists of two sections separated by a matchplate on which core details are placed. Mercury is poured into the cavities on either side of the matchplate, then frozen. The matchplate is removed and the two portions of the die are brought together and tapped lightly with a small rawhide mallet to insure that the die sections meet. Large contacting surfaces are sometimes lightly scored before assembling to insure a good weld. The die is then opened and the assembled pattern removed.

Other Accessory Devices Seldom Necessary

Alignment of the die is maintained through the use of precision die dowels; other accessory guide devices may be employed, but are seldom necessary. This method of assembly-welding permits, along the parting line, registry limited only by tool making accuracy. In the direction perpendicular to the parting plane no loss or gain of tolerance is encountered.

Self-welding properties are used to other advantages. Most castings made by this process are large enough to require patterns of gating and risering systems to be made individually. In these cases, the main portion of the pattern is frozen in the usual manner, while the gating and risering system are frozen separately and joined by booking. Individual small mercury patterns may be assembled easily by merely pressing them onto a common sprue.

Defects or fine lines that may result from booking are repaired by pouring liquid mercury over the defect or smoothing the defect with a small knife or tool. Mechanical properties of mercury at process temperatures are comparable to those of lead at room temperature. Mercury patterns are soft, ductile, and malleable, thus can be easily formed into a given shape. To repair damage to a mercury pattern it is necessary only to press a small amount of frozen mercury into the defect and smooth it into the general contour of the body of the pattern.

Large Precision Castings Can Be Made

One important advantage of this process is that large precision castings can be made from frozen mercury patterns because mercury, at temperatures near —100 F, is strong, possesses good creep resistance, and has little volume expansion on changing from a solid to a liquid. Volume expansion of mercury on melting is 3.47 per cent; expansion of waxes used in precision casting patterns is about 9 per cent. The small volume change which occurs during melting the mercury pattern from the ceramic mold produces little strain on the mold and allows large patterns to be used. Thus, the limits of size and section which are accepted for investment castings by other processes are not applicable to the frozen mercury process.

Dimensions of castings in regular production in the wax process usually do not exceed 6 in. In some cases, however, patterns measuring almost 14 in. have been made using a combination of wax and plastic. Castings of this size are common in the mercury process, and castings of 42 in. diameter weighing over 300 lb have been made in regular production.

Employs a Thin Ceramic Shell Mold

Unlike other investment casting methods, the frozen mercury process employs a thin ceramic shell mold in which molten metal is cast. A shell 1/16 to ⅛ in. thick, sufficient to withstand the strains imposed in melting the pattern, is built up by dipping the mercury pattern into ceramic slurries kept at —80 F. The shell is made by successively dipping the pattern into

Fig. 4 . . Refractory shell is produced by dipping mercury pattern into ceramic slurry and drying on side racks.

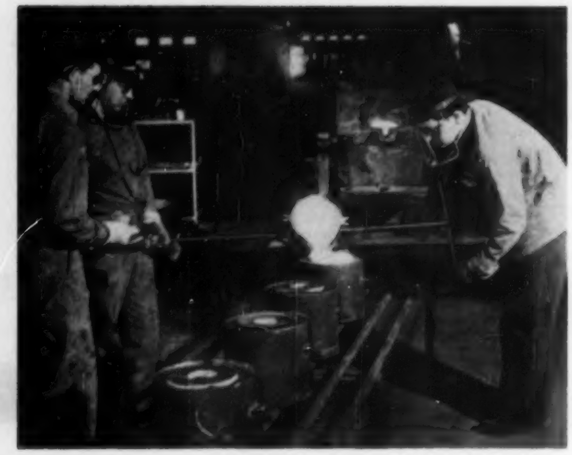


Fig. 5 . . Thin, uniformly permeable shell mold permits pressure, centrifugal, or suction casting techniques.

slurries of increasing viscosity until the desired shell thickness is reached.

The first slurry, of very small refractory particles and very thin, imparts excellent surface finish to the casting. A highly volatile vehicle is employed in the slurries to dry the ceramic coatings at low temperatures in a very short time. Drying time is only a few minutes for the first coat because it is only a few thousandths of an inch thick. As the viscosity of the slurry increases, the drying time of the coating increases also.

Frozen mercury is extracted from the shell mold by simply running mercury at room temperature into the sprue or gate, like washing mud from a river bank. After most of the mercury has been washed out of the heavy sections, the mold is allowed to come to room temperature and the remaining mercury is poured out. Recovery of mercury is practically complete. Since volumetric expansion of mercury is small, it is not necessary to use much care in melting the pattern.

Although green molds are fairly strong, it is usual practice to fire them soon after removing the pattern. It is not necessary to use an elaborate preheat procedure to prevent cracking or spoiling. Green molds are placed directly into a furnace and held at 1850 F for about 2 hr. They are then removed and allowed to air cool. Again, it is not necessary to control the condition of cooling. Molds may be stored at room temperature for an indefinite period and used when desired.

Since the ceramic shells are uniformly permeable, it is possible to employ suction casting techniques. For this purpose, molds are placed in a flask containing loosely packed material such as shot or coarse sand. A tight cover is formed of a layer of ceramic cement. When suction is applied to this system and metal is poured, uniform filling takes place. It is thus possible to cast sections of extremely thin cross-section without resorting to preheating the mold. This is, of course, of great advantage in cases where grain size control is important. Pressure or centrifugal casting techniques can also be used, as well as suction.

Another advantage which accrues from thin shell molds is in the removal of cores. Cores are broken by rapping the gate or sprue with a pneumatic hammer; fragments are then shaken out. Because the ceramic molds are unreactive with molten metals, a large variety of metals has been cast with a minimum of trouble. Molten titanium will react with all known refractory materials, yet it has been cast successfully in ceramic molds produced by the frozen mercury process.

List Four Crucible Care Rules

In melting aluminum and aluminum alloys, proper care of the crucible can greatly prolong its life and effect substantial savings in time, money and labor.

For correct use of large, carbon-bonded, silicon carbide crucibles, Electro Refractories and Abrasive Corp., Buffalo, N. Y., offers the following suggestions:

1. Scrape the crucible thoroughly after every heat while it is still hot to remove dross. Particularly, at the end of each day, empty the crucible completely and scrape it absolutely clean. A clean crucible makes for clean metal. Many hard spots in aluminum castings have been traced to aluminum oxide dross. As dross builds up, more and more heat is needed to penetrate the crucible walls and the oxide layer. This wastes fuel and increases melting time. Too much dross may break a crucible as the dross expands faster than the crucible when heated.

2. Where possible, avoid leaving even a small frozen metal heel in the crucible before heating. When warmed, the metal expands more than the crucible and may split it.

3. A crucible can often be broken by adding a large amount of cold ingots to a relatively small amount of molten metal in the bottom of it. Temperature of the molten mass may be lowered to the point where it solidifies. Another cause of breakage is loading ingots cross-wise in the crucible or packed together against the crucible sides.

4. Finally, dropping an ingot to the bottom of a crucible is very apt to break it. Silicon carbide crucibles are something like porcelain dishes and not made to withstand a hammer blow.

Dump Boxes Speed Sand Transfer

Practical ideas, developed and proved in foundries and pattern shops, are presented on this page. What's your idea?

■ Unable to get hopper cars regularly for transporting sand at Symington-Gould Corp., Assistant Works Manager Joseph G. Buehlmann has replaced gondola cars with transfer boxes on flat cars.

Sand is delivered to sand storage in box cars, unloaded by tractor shovel, and stored in either bins or silos. Transporting sand from storage to foundry was formerly accomplished by gondola cars loaded directly from the silos or by clam shell from the bins. The car was unloaded in the foundry into a track hopper by another clam shell.

Eight transfer boxes on flat cars have replaced the gondola car. The boxes are of welded 1/4-in. plate, reinforced on the outside at all corners with 4 x 1/2 x 4-in. angles, and at three positions around the sides and bottom and at the end opposite the discharge door with 1/2 x 8-in. straps. Four sling hooks cut from 1 1/2 x 8 x 28-in. plate are welded to two sets of side reinforcements. A 3/8-in. plate gate slides in guides over the discharge opening which is reinforced on the inside with 1/2 x 4-in. plate around the opening and 1/2 x 8-in. plate across the bottom under the opening. The 3100-lb box is 4 x 8 x 4 ft deep, and has a heaped capacity of 15 cu yd or 11,500 lb.

The boxes are loaded with sand by clam shell then placed by crane sling on the flat car. In the foundry the box is placed by another crane sling onto a tilting platform at the edge of the track hopper. The rocking platform is pivoted off center, leveled by a counterweight, and tipped to the desired angle for discharging by the weight of the box of sand unbalancing the mechanism to the track side of the pivot. The lever operated discharge door is opened manually to permit the sand to flow through.

Above . . Discharge end of sand transfer boxes showing sliding door.

Below . . Side view of sand boxes and tilting platforms for gravity discharge.

The main advantage of using the transfer box is in the foundry where clam shell unloading is no longer necessary. The crane, used only intermittently for handling the boxes, is released for other work. The boxes can be stacked either at storage or in the foundry to save floor space, provide additional storage, and allow more efficient scheduling of labor.—*R. A. Booth, editor, Symington-Gould Coupler.*

T. R. STANLEY / *Foundry Superintendent*
Consolidated Mining & Smelting Co. of Canada
Trail, British Columbia

Casting Steel Pots

for metallurgical use

Production of large castings for handling molten lead and red-hot slag is described in this paper originally presented at the recent Nortwest Regional Foundry Conference.

■ Expendable castings, such as grinding balls, ball mill liners, sand pumps, and various shapes and sizes of pots, pans, and kettles which are subject to intense abrasion or corrosion in service and must be replaced from time to time are produced in the foundry of Consolidated Mining & Smelting Co. of Canada, Ltd. (Cominco), Trail, B. C. Because most Cominco products are molten at some stage of manufacture, while some are dense, or highly corrosive, or treated, transported, or stored in the molten state, the foundry has improved molding methods, chemical composition, and heat treatment to produce sound, rigid, and corrosion and heat resistant castings.

The company manufactures process containers variously called pots, pans, or kettles according to their shape or purpose—ranging in size from research units of 5-lb capacity to containers of 100-ton capacity. These include parting kettles, bismuth pots, zinc pots, lead treating kettles, lead transfer pots, liquation pots, slag pots, slag settlers, steel heat treating pots, magnesium melting pots, and aluminum melting pots.

Transfer Pots Have Undergone Refinements

Transfer pots to carry molten lead (bullion) from the lead smelting blast furnace to the drossing furnace have undergone many refinements in design. These pots must withstand heat shock from contact with large masses of red hot lead. Failure of such a pot would produce a serious safety hazard and also be costly in the loss of lead worth $100 per cu ft.

Practice was to make the 12-cu ft cast iron pots with 2 in. thick side walls tapered from a 3 in. bottom.

Fig. 1 . . 60-ton capacity lead pot ready for weld assembly.

Fig. 2 . . Model metallurgical pots: upper, l. to r. are a lead bullion and a slag pot; lower, l. to r. are a lead transfer, a tin, and a lead slag settling pot.

There were two trunnions on the sides and four solid feet and two dumping loops at the bottom. The thick section and concentration of mass at the bottom made such pots susceptible to fracture from heat shock.

Some improvement was realized by making the transfer pots of steel using the pattern designed for cast iron. Various compositions were tried, including the common alloy steels and malleable iron, but the results were disappointing. A completely redesigned pot with corrugated bottom, thin hollow feet, and decreased section of 1¼ in. tapering from 1½ in. at the rim, had a considerably extended life but was difficult to produce.

Pot Is Molded Bottom Down

The redesigned pot weighing 3200 lb is molded bottom down. The cope half (inside) of the pot is formed around a steel foundation known as the anchor. Six support feet and a pair of side trunnions form thick sections which create hot spots and feeding problems. To feed trunnion sections a 10-in. diameter riser is placed over each. Solidification of the feet is controlled with internal chills in the feet junctions and external chills on the inside surface of the pot opposite the feet junctions. The external chills, which tend to drop out when the green cope is lifted from the pattern, are tack welded to hanger rods which are bent to hook into holes in the anchor.

Fig. 3 . . Slag pot drag with green core, ready for cheek.

Cast iron rings are rammed at 10-in. intervals in the cope to prevent the over-hanging sand from splitting and spalling off. The entire core iron assembly is bolted to a pair of I-beams in the cope flask. A pocket of coke is rammed in the center to facilitate the escape of mold gases and to decrease the time required to dry the mold. The mold surface is nailed, then painted with silica wash, allowed to stand a few hours to air dry, then assembled. A portable drier is placed over one riser and hot gases are blown through the mold until it is dry. A few hours before pouring, the cope is lifted, the mold cleaned, then re-assembled for pouring.

Gating has always been a problem. At one time or another, almost every conceivable position and method of gating has been tried, yet hot spot, shrink, hot tear, or scab defects were encountered. The best results have been achieved with a single gate on the side of the pot about ⅛ of the distance from bottom to rim. Metal is run through an 8-in. blind riser placed 2 in. from the pot where the gate joined the pot. Before the blind riser was used, it was considered worthwhile to chip out and weld this local porous area to obtain the other advantages of this gate position.

Metallurgical Control Pays off

Some years ago, these transfer pots were occasionally found to be cracked when removed from the mold. Although several theories were advanced to explain the cracks or tears, the generally accepted one was that the rigidity of the mold prevented natural metal contraction. To remedy this, the cope was lifted while the casting was red hot and the drag was turned on its side. Men then freed the anchor with bars, shovels, chipping guns, etc. This did not prevent an occasional pot from being cracked, so the procedure was abandoned, much to the satisfaction of the men involved. The solution appears to lie with metallurgical control of the steel rather than physical control of the mold as not one of these pots has been cracked on shake-out for years.

The largest pot made at Cominco is a 23,000 lb casting of 100 tons lead capacity (approximately 300 cu ft). This pot is used in the refining of lead bullion at temperatures up to 1000 F. At this temperature, lead will penetrate the slightest crack or other surface defect, therefore no porosity whatever can be tolerated. Furthermore, once a porous area has been saturated with lead, it cannot be welded with any assurance of success. The slightest surface defects are explored and repaired before the pot is placed in service.

Eliminate Centerline Shrinkage

Several pots were made before one was produced which satisfied the lead smelter operators. Early attempts suffered from hot tears, centerline shrinkage, and wormholes. Experience eliminated the hot tears, but the centerline shrinkage persisted as did the wormholes. Lead ran through the wormholes into the shrink area, saturated it and ran out through a wormhole in the outer face. It might take some time to find an outlet, but once started, leaks were rarely sealed.

Since centerline shrinkage is eliminated by adequate risers, the number and size of risers were increased with a corresponding improvement in casting quality. However, this modification was limited by melting capacity which is 30,000 lb of steel. Based on experience with other classes of steel castings, it was decided to cast the pot in two pieces, then weld them together. Also the foundry has insufficient crane capacity to handle one piece molds, of the size required for 23,000 lb castings.

The mold for the top half is made by assembling a number of cores in a concrete pit, then ramming molding sand to hold them in position. The mold face of the cores is composed of new silica sand facing, the remainder is reclaimed floor sand. The outside cores for this assembly are large and rigid, 10 segments

making the ring. A cast iron frame is used in each core to supply the required strength. The inside ring is composed of 11 slab cores about 8 in. thick extending the full depth of the casting. They are positioned by a print register at the bottom and a recessed cover core at the top. A cast ring is placed in the center of the mold, then sand is rammed between it and the cores to hold them in position. Three lengths of ½-in. chain are imbedded in the rammed sand to facilitate shakeout. Eight 10-in. diameter risers are arranged at equal intervals around the flange. Four, 2-in. diameter gates at 90 degrees to each other lead from a central pouring basin into the bottom of the mold cavity. The flange cover cores are sprinkled with loose sand, then covered with sections of plate. 8 in. x 8 in. x 14 ft beams are placed over the plates at about 2 ft intervals and secured to eye bolts imbeded in the concrete walls of the pit. Coarse paper is pasted over the riser openings, riser pins are placed in position, and about a two-foot depth of sand rammed over the assembly.

Dry Mold Through Risers

Two mold driers are placed at opposite sides of the mold (each over a riser) and hot air is blown into the mold for about 48 hr to dry it. Extreme care is necessary at this point to prevent dirt from falling through the riser openings into the mold.

Forty-five minutes after the casting is poured, the rammed-up chains are withdrawn to loosen the inside sand and allow the pot to contract without undue hindrance and hot tearing. The hold-down beams are removed while the casting is still red hot, then the cast iron ring is pulled out.

The bottom section of the pot, a deep saucer shape about 7 ft in diameter, is molded bottom up, using a sweep in lieu of a full pattern. Five 12-in. risers on the top surface appear to be sufficient to eliminate centerline shrinkage.

The two sections of the pot are chipped and dressed. The edge of the top section to be welded is beveled with an automatic cutting torch, then ground with a disc grinder to remove scale. It is set in an inverted position to be marked for size. A disc cut from ½-in. steel plate is temporarily tack welded into this section to act as a platform for the cutting torch with which the bottom half is beveled. The disc is removed and the two sections are tack welded together, leaving a ⅛-in. space between them. Four welders then weld the bottom to the sides. The pot is turned over and the first pass of the weld chipped out. A finish bead is applied to complete the seam on the inside of the pot.

Cast-Weld Construction Successful

The practice of welding two cast sections together appears to be successful since the first pot so made two years ago has yet to leak. Wormholes, however, have not been satisfactorily overcome. The inside surface of the pot is carefully examined for pin holes and other defects which, however minor they may appear, are dug out with an air arc torch and welded.

After the pot has passed inspection, it is heated to 1650 F and held five hours, then slowly cooled at 30 to 40 F per hour. Such slow cooling should not be necessary for a pot that is to operate at 800 to 1000 F, but

settler

Fig. 4 . . Two-part pattern for lead slag settling pot.

Fig. 7 . . Dried and cleaned mold is closed for pouring.

experience indicates increased service life when the pot is so treated. There is also evidence to suggest that a type of failure resembling stress corrosion is retarded when the pot is cooled slowly from heat treating temperatures.

As regards composition of the steel, S.A.E. 1020 specifications give good results. Manganese appears to be the most critical element as it must be controlled within narrow limits in order to produce a sound casting which will stand up to the rigorous service to which the pot is subject. A manganese content between 0.70 per cent and 0.75 per cent is preferred.

Cominco slag pots weigh 13,000 lbs, are 6 ft in diameter by 6 ft deep, and have trunnions on the side and

pot production steps . . .

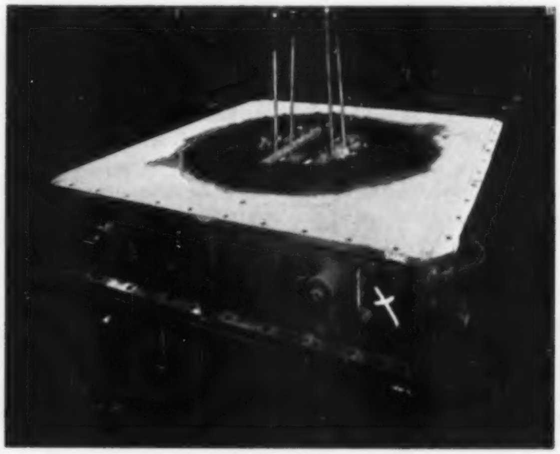


Fig. 5 . . Core and pattern in drag ready for cope.

Fig. 6 . .Portable driers positioned on finished mold.

Fig. 8 . . Rough casting as removed from sand.

Fig. 9 . . Finished settling pot ready for shipping.

six feet on the bottom. They are made by conventional three-part flask method, not because the shape requires three parts, but because crane facilities are insufficient to handle a one-piece cope. Slag pots have been sucessfully made bottom-up by the following method for many years.

Can't Roll Flask

The flask used is too cumbersome and heavy to roll safely, so the pattern is built with a loose piece for the bottom to permit ramming the inside and outside of the pot without changing the position of the pattern. A 12 in. deep drag flask is laid on the bottom board. The board is covered with coke, sand is rammed over the coke with the slinger until the flask is full, then it is struck off to form a level bed. The pattern is placed mouth down on the bed and a parting joint is cut to follow the contours of the rim and lips. The loose bottom piece of the pattern is removed and the inside of the pot is rammed with sand and coke. The coke is arranged to form a cone in the center of the mold. Cast chills about 3 in. thick are placed against the pattern face opposite the trunnions. The top is swept to the shape of the loose bottom piece which is then fitted back onto the pattern.

A cheek flask, fitted with cast iron corner pieces and side chucks to carry the sand, is placed on the drag flask. The cheek is deep enough to reach from the rim

Fig. 10 . . Swept mold for slag pot replacement bottom.

Fig. 11 . . Steel gear blank rigged for radiographing. The same set-up is used for radiograph pots.

of the pot to the joint between the loose bottom piece and the pattern. Sand is rammed around the pattern to a fixed depth which is marked on the pattern. Ram-up cores are placed against the pattern to form the pot trunnions. The remainder of the sand is then rammed into the cheek and a second parting joint formed level with the flask top.

Pour Mold in Concrete Pit

The cope flask is placed in position and rammed up. Two 12-in. openings diametrically opposite each other, 24 in. from the center, are left to act as risers. A 3-in. sprue pin is run through the cope and cheek to the joint between the cheek and drag where the gate is run into the pot lip.

When completed, the mold is assembled in a 6-ft deep concrete pit. A portable mold drier is arranged over each riser, and hot air and gas are blown into the mold for several days to thoroughly dry it. When dry, the mold is opened and cleaned, then closed and clamped; all openings are sealed with wrapping paper. The sides of the mold are braced against the walls of the pit, then sand is rammed around the flask to a depth of three feet to seal the bottom joint.

Risers are cut off while the pot is still above 800 F. After cleaning, the pot is heated to 1650 F, then cooled slowly.

These pots are subject to severe service. They are filled rapidly with red-hot slag and may sit for hours before being emptied. As a result, they fail from heat checking and cracking on the inside surface of the bottom. It is usual to cut out a damaged bottom and replace it with a newly cast one which is welded into position. Several bottoms may be used with a top section before it is discarded. The life of a replaced bottom is approximately the same as the original bottom. There has been no evidence of centerline shrinkage in any of the pots cut for repairs.

Control Carbon and Manganese

Service conditions tend to cause graphitization of the steel if it is at all susceptible. Therefore, 0.20 to 0.25 per cent carbon and 0.70 per cent manganese are considered desirable. There is also a gradual coarsening of the grain structure so that, by the time the pot is discarded, the steel may be quite brittle.

Pots which are experimental or whose design is not finalized and replacement bottoms are sometimes molded with a sweep and spindle to avoid the expense of a full pattern. Sweeps cost much less to make, handle readily, and do not require special storage facilities. This method works well for shallow molds, but because it is not possible to ram the mold surface very hard by the sweep method, there is a tendency for swells and center line shrinkage in deep molds.

Sweep Some Molds

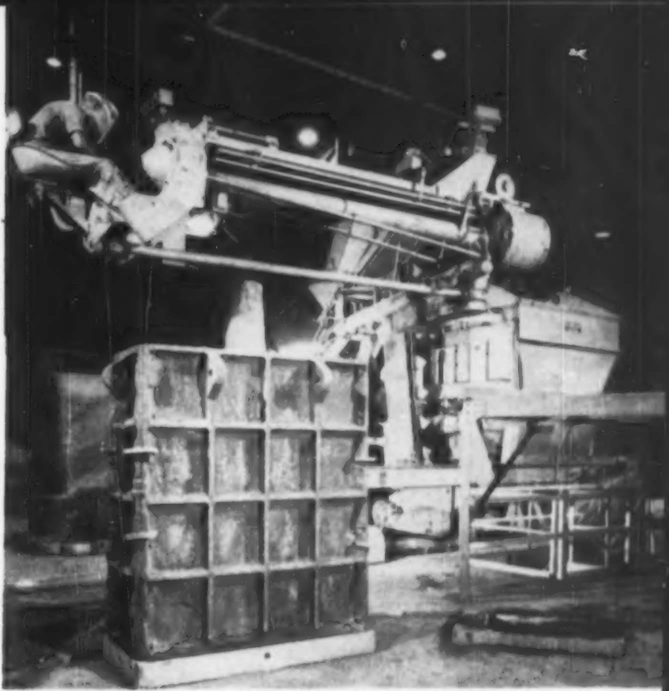
This method is best illustrated by the production of a 5-ft diameter, 4-ft deep parabolic shaped pot which is made mouth down. Metal thickness varies from 1½ in. near the flange to 2½ in. at the bottom.

A spindle and rod are erected on a bottom board, a 10-in. deep flask is placed on the board, and a pocket of coke is built up over the spindle and around the rod. Sand is added and the joint struck off. A wooden pattern of the flange is bedded in the joint. A column of sand is built up a few shovels at a time to the rough shape of the pot. The sweep is affixed and rotated to form the outside contour of the pot. Parting sand is rubbed over the surface so formed, and the cope is rammed against it using the sand shape as a pattern. The cope is removed and finished. A thickness piece is fastened to the sweep and used to scrape a layer of sand from the first formed part equal to the thickness of the pot. The drag is then finished, nailed and silica washed. The mold is assembled and dried with portable driers.

One 12-in. diameter riser capped with a 16-in. square riser in the center of the bottom is used. The gate is run into the flange at two places. Present preference is for the high carbon cast iron, although mild steel, molybdenum steel, and low carbon cast iron, have been tried.

Ten-ft diameter, 12-in. deep evaporating pans have also been made using the sweep method. This method has been found so satisfactory that its use has continued after the design was finalized.

Modern Plant Replaces 50-Year Old Ingot Mold Foundry



Slinger poised over corebox assembled on molding turntable can ram 500 tons of sand daily.

■ United States Steel's new ingot mold foundry at the Edgar Thomson Works, Braddock, Pa., has a capacity of 275,000 tons of ingot molds annually, and will supply molds for the corporation's basic steel mills in the Pittsburgh-Youngstown district and for the Fairless Works. Electric powered equipment and latest material handling facilities enable production of molds weighing up to 35 tons and as high as 110 in. Occupying two acres, hear the blast furnaces, the new installation spans the entire cycle of ingot mold production from sand storage to finished casting.

Silica sand is moved on belt conveyors to the foundry from bins holding 100 tons of new sand and 200 tons of reclaimed sand (reserve space exists for 250 tons). Bucket elevators, feeders, screens, and a 25-ton crane complete the modern sand handling facilities.

Hand ramming and air tamping have been replaced by sand slinging. Mobile slingers, equipped with 20-ton sand tanks, move the length of the foundry on standard gauge railroad tracks between four turntables on which molds are prepared.

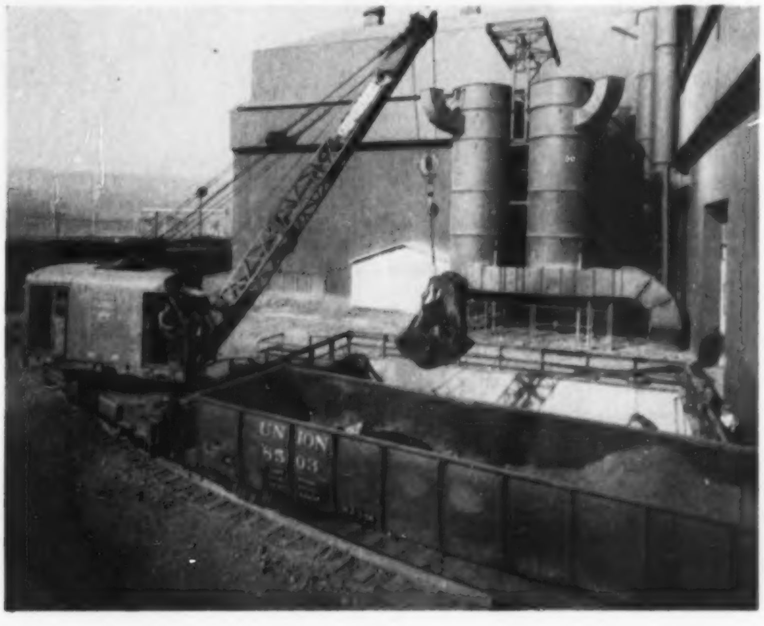
Sand cores and molds are dried in eight re-circulating down-draft ovens at closely controlled temperatures up to 750 F. These ovens have a total capacity of more than 1000 tons of molds daily. Overhead cranes carry the sand molds from the ovens to the pouring stations.

Pouring takes place at one of three pouring stations, each accommodating 40 molds. Electrically tilted ladles deliver blast furnace iron to 20-ton casting ladles, which, in turn, travel by crane to the pouring stations.

Five dust collectors, one at each of two shake-outs, remove dust laden air at the rate of 168,000 cfm to keep foundry dust at a minimum. Heating and ventilating systems are designed to provide pleasant working conditions. Sixteen exhaust fans, each moving 66,000 cfm, can change the air in the building 14 times an hour. The heating system can supply a total of two million Btu per hour.

Buildings and equipment used over 50 years by Edgar Thomson were removed to make way for the modern ingot mold producing installation.

Dust from spray towers (rear) is removed as sludge from settling basins.



Advantages of

Automatic Moisture Control

WILLIAM E. PATTERSON / *Vice-President*
Elkhart Foundry & Machine Co.
Elkhart, Ind.

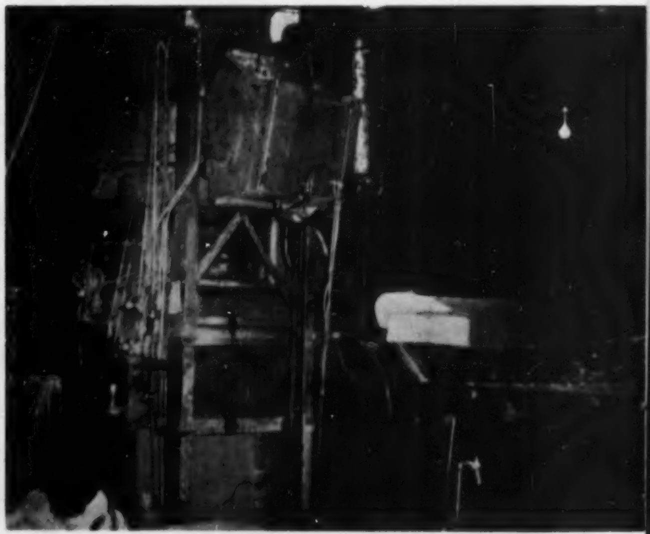
Automatic moisture control is practical in a 40-ton a day shop. Advantages reported at the Metals Casting Conference are: improved casting quality, increased production, and decreased sand mill maintenance.

■ Since November 1953, Elkhart Foundry & Machine has had in successful operation an automatic sand tempering unit. It is believed to be the first application of automatic moisture control to a skip hoist operation.

The automatic tempering unit consists of three electronic circuits coupled together by mechanical linkage to automatically compute the volume of water necessary to raise the moisture content of a given weight of sand to any predetermined value.

One of the three circuits is the return sand moisture measuring circuit. It measures the moisture of the return sand in the skip hoist (also batch hopper or belt conveyor) just before it enters the sand mill. The device in contact with the sand just before it is discharged into the sand mill is called a capacitance moisture probe. It is mounted so as to be completely covered by the sand.

As the moisture content of the sand surrounding the probe changes, a corresponding change in the electrostatic field surrounding the probe also takes place due to the change of the dielectric constant of the sand. Bone dry sand has a dielectric constant of two to three, whereas water has a dielectric constant of 80. Therefore, as the moisture in the returned sand increases or decreases, the dielectric constant of the sand increases or decreases. This causes a current to flow in the electronic equipment which drives an indicating instrument calibrated to read directly in per cent moisture of the returned sand. It also feeds the information into a third circuit described below.



Flexible cables do not interfere with skip operation.

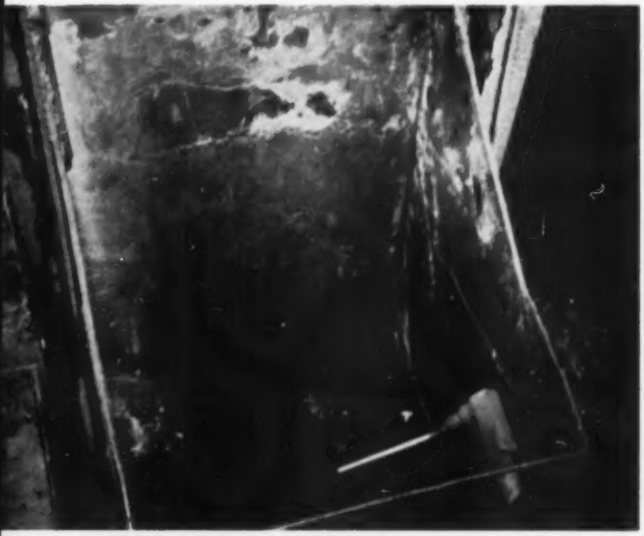
The second circuit, called the temperature measuring circuit, consists of a temperature-indicating instrument and a thermocouple. This circuit determines the moisture that must be added to compensate for evaporation losses.

The third circuit, the water tank circuit, combines the electronic effects of temperature and moisture in the returned sand to measure the moisture needed by the batch of sand in preparation.

As the returned sand in the skip hoist is received, it comes in contact with the moisture and temperature

Moisture Control with Automatic Tempering

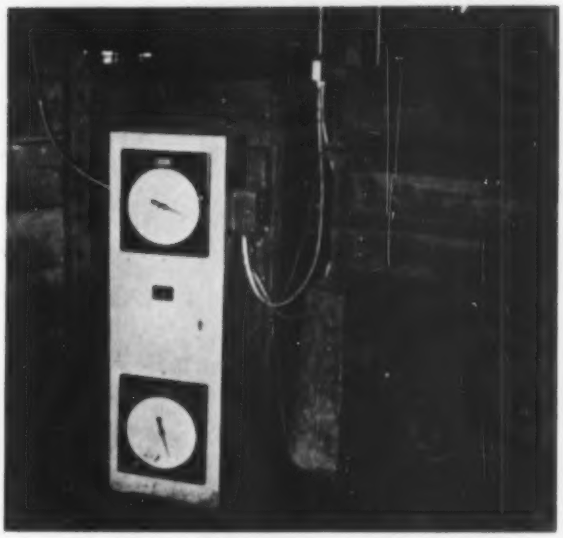
Incoming Moisture, %	Sand Temp, F	Outgoing Moisture, %
2.9	108	5.8
3.2	95	5.6
3.2	90	5.6
3.2	95	5.7
3.1	103	5.6
3.3	105	5.5
2.8	80	5.7
2.9	85	5.6
3.0	90	5.5
3.0	90	5.6
3.2	100	5.5
3.1	100	5.6
3.4	85	5.7
3.4	100	5.5
3.2	95	5.7
3.4	100	5.6
3.5	100	5.5
3.6	100	5.6
3.6	90	5.6
3.5	95	5.7
4.3	100	5.4
3.7	85	5.7
4.0	100	5.6
3.5	100	5.7
3.3	100	5.7



Electronic probe protrudes from side of skip bucket.

probes, thus causing the moisture and temperature instruments to turn. When the mulling cycle calls for water to be put into the tank, the inlet water solenoid valve is energized and the required volume of water flows into the tank.

At Elkhart Foundry & Machine, the moisture probe, the thermocouple, and the skip hoist level probe are inside the skip hoist. All are connected to the control cabinet by coaxial cables encased in rubber-covered flexible conduits. Batch size in the skip hoist in maintained uniformly and automatically by the level probe.



Electronic controls for computing and adding water.

Uniformity of Sand Properties with Automatic Tempering

Moisture, %	Permeability	Green Compression, psi
5.6	85	10.9
5.7	85	10.2
5.7	90	10.5
5.6	90	10.7
5.5	90	11.2
5.6	90	10.4
5.6	90	10.9
5.5	90	10.0
5.6	90	10.9
5.6	90	11.1
5.6	85	11.5
5.6	90	11.7
5.8	80	10.9
5.8	85	10.8
5.7	95	10.9

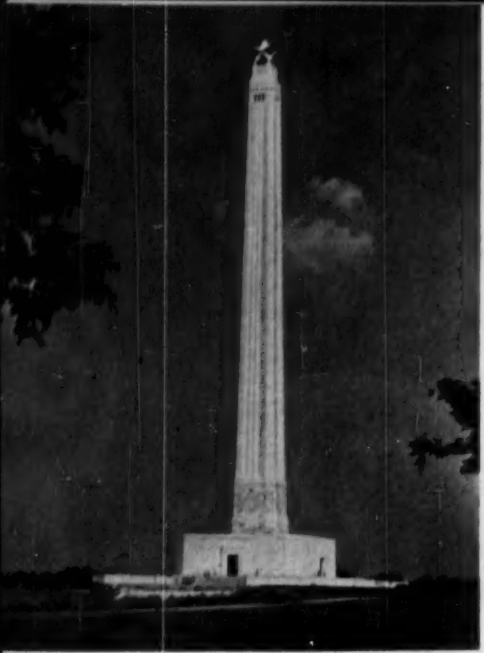
After the skip hoist has been filled, the automatic tempering unit fills the auxiliary water tank as outlined above. With the raising of the skip hoist, a limit switch is tripped, allowing the predetermined amount of water to be discharged into the muller under air pressure.

The author's foundry has benefited from the installation of this unit in the following manner:

1. Improved casting quality. Scrap due to varying moisture content of sand has been eliminated. Permeability and green strength have been stabilized. Flowability of molding sand has been increased as well as controlled. Slinger operators have a better chance to ram a more consistent mold.

2. Increased production. A supervisor who did nothing but control sand coming from the muller is now working on increased production. Down time due to sand that is too wet or too dry to use has been decreased. Every pound of sand mulled now is used.

3. Decreased maintenance on mill. All the tempering water used in the mill enters before the sand. This has eliminated most plow and liner troubles.



Start Hotel Assignments February 15

For Houston AFS Convention

San Jacinto Monument, memorial to heroes who won independence for Texas April 21, 1836, is on battlefield, 22 miles southeast of Houston.

Assignment of hotel reservations for the 1955 AFS Convention—Houston, May 23-27—will start on February 15.

All applications received by the Housing Committee before that will be considered as having arrived on that date. Nevertheless, convention-goers are urged to fill in both sides of the form at the top of the facing page and send it promptly to: AFS Housing Committee, PO Box 5146, Houston 12, Texas. Hotel reservation blanks will not be mailed directly to the foundry industry as in former years.

Most meetings of the 1955 AFS Convention will be held at the Rice Hotel and the Shamrock Hotel. Convention registration will be at the Rice; ladies registration will be at the Shamrock.

Houston, with more air conditioned hotel rooms than any other city in the country, will be the crossroads of the castings industry during Convention Week. The city can be reached by eight airlines: American, Braniff, Chicago & Southern, Eastern, Mid-Continent, Pan American, Pioneer, and Trans-Texas. The airport is only 10 miles southeast of the center of town.

Railroads to Houston include: Burlington, Missouri-Kansas-Texas, Missouri Pacific, Rock Island, Santa Fe, and Southern Pacific. Railroad stations are shown on the map of downtown Houston on page 53.

As in the past, this year's Con-

Tentative Program . . . 59th Annual Meeting
American Foundrymen's Society
Houston, May 23-27, 1955

Sunday, May 22
5:30-7:00 pm . . PRESIDENT'S RECEPTION

Monday, May 23
9:00 am . . Registration and Publications Display Opens
10:00 am . . Technical Sessions: Brass & Bronze; Malleable
12:00 noon . . Round Table Luncheons: Brass & Bronze; Malleable
2:00 pm . . Technical Sessions: Education; Light Metals; Sand
4:00 pm . . Technical Sessions: Brass & Bronze Shop Course; Light Metals; Malleable Shop Course—*"Pearlitic"*
5:00 pm . . Registration and Publications Display Close
8:00 pm . . Shop Courses: Gray Iron; Sand

Tuesday, May 24
8:30 am . . Registration and Publications Display Open
9:30 am . . Technical Sessions: Light Metals; Industrial Engineering; Brass & Bronze; Malleable; Sand
12:00 noon . . Round Table Luncheons: Light Metals; Education
2:00 pm . . Technical Sessions: Safety, Hygiene, and Air Pollution Control; Industrial Engineering; Brass & Bronze; Sand; Malleable
4:00 pm . . Technical Sessions: Brass & Bronze Shop Course; Malleable Shop Course—*"Hot Tearing"*; Safety, Hygiene, and Air Pollution; Light Metals
5:00 pm . . Registration and Publications Display Close
6:00 pm . . Sand Division Dinner
6:30 pm . . AFS ALUMNI DINNER
8:00 pm . . Shop Courses: Gray Iron; Sand

Wednesday, May 25
8:00 am . . AFS PAST PRESIDENTS' BREAKFAST
8:30 am . . Registration and Publications Display Opens
9:30 am . . ANNUAL BUSINESS MEETING
10:15 am . . CHARLES EDGAR HOYT ANNUAL LECTURE. Speaker: F. J. Walls, International Nickel Co., Detroit
12:00 noon . . Round Table Luncheons: Pattern; Industrial Engineering; Gray Iron
2:00 pm . . Technical Sessions: Refractories; Sand; Steel; Light Metals; Safety, Hygiene, & Air Pollution Control
4:00 pm . . Technical Sessions: Plant & Plant Equipment; Gray Iron; Safety, Hygiene, & Air Pollution Control; Pattern; Heat Transfer
5:00 pm . . Registration and Publications Display Close
7:00 pm . . AFS ANNUAL BANQUET

Thursday, May 26
8:30 am . . Registration and Publications Display Open
9:30 am . . Technical Sessions: Gray Iron; Pattern; Sand; Steel
12:00 noon . . Round Table Luncheon: Steel

AFS BOARD OF DIRECTORS' LUNCHEON

2:00 pm . . Technical Sessions: Sand; Gray Iron; Refractories; Safety, Hygiene, & Air Pollution Control; Cost
4:00 pm . . Technical Sessions: Gray Iron; Sand; Heat Transfer; Plaster Mold Casting
5:00 pm . . Registration and Publications Display Close
7:00 PM . . TEXAS CHAPTER NIGHT

Friday, May 27
8:30 am . . Registration and Publications Display Open
9:30 am . . Technical Sessions: Gray Iron; Sand; Steel
2:00 pm . . Symposium on Non-Destructive Testing

American Foundrymen's Society

Application for Hotel Accommodations

59th ANNUAL CONVENTION — HOUSTON, TEXAS
MAY 23-27, 1955

APPLICANT.. TITLE ....

COMPANY ....

STREET ADDRESS ....

CITY...ZONE......STATE...........

Important

After Listing Complete Requirements on reverse side mail This Application Direct to:

AMERICAN FOUNDRYMEN'S SOCIETY
HOUSING COMMITTEE
POST OFFICE BOX No. 5146 • HOUSTON 12, TEXAS

TIPS

For Making Hotel Reservations

AFS has confirmed agreements with all major Houston hotels, guaranteeing the Convention a room supply considered adequate for the 1955 Foundry Congress.

NOTE: All applications received by February 15, 1955, will be considered as of that date for assignment beginning then, BUT NOT EARLIER. You will receive confirmation direct from the Hotel accepting your assignment. Applications received after February 15, 1955, will be assigned in the order received.

APPLICATIONS: All are urged to make room applications only for themselves, their employees or bona fide representatives. Only the official housing committee will acknowledge applications, make assignments, notify applicants and the hotel and adjust assignments to changed conditions.

Be sure to show date and approximate hour of arrival (indicate late arrival if after 6 P.M.) on Application form, and check these against Room Confirmation, as soon as received. If a change in arrival date or time becomes necessary, wire the hotel to which assigned NOT AFS or the HOUSING COMMITTEE.

DO NOT cancel confirmed reservation direct to Hotels to which assigned: INSTEAD, NOTIFY the HOUSING COMMITTEE so that reassignment can be made to some other Foundryman at the same time the original assignment is canceled.

Provide names of ALL occupants for rooms with applications. Names of all individuals must be furnished before hotels can confirm assignments. Companies sending a number of employees should include all on one application, indicating on a separate sheet the expected arrival of each employee, and indicate persons to be assigned together.

To accommodate maximum attendance, friends and associates are urged to "double up," making application (on one form) for assignment to Double or Twin Bedrooms.

If the Hotel of your First Choice is unable to accept your reservations, due to capacity bookings, the housing committee will attempt to make reservations in the order of your preference. For this reason it is necessary to list (4) Four hotels. (Practically ALL Hotels are Air Conditioned.)

AFS CONVENTION POLICIES

HOTEL SIGNS. No directional or informative signs indicating the headquarters or events of firms or individuals attending the Convention will be permitted in lobbies, halls or corridors, or on hotel bulletin boards, except as may be specifically authorized by the Society.

HOTEL EXHIBITS. No sleeping rooms, suites, sample rooms or public space in Houston hotels will be rented or permitted to be used for exhibit purposes during the Convention period.

ENTERTAINMENT. AFS believes that a certain amount of relaxation and social activity is an accepted phase of any successful convention, BUT also believes that excessive or unlimited entertainment is detrimental to the best interests of the Society, members, and the Foundry industry as a whole. For this reason, the agreement between AFS and Houston hotels precludes the assignment of public space (i. e., ballrooms, large meeting rooms, and the like) for entertainment purposes, except the hours of 5:00-7:00 p.m. and then only with written approval of the Society.

The Society therefore requests the cooperation of all in eliminating the "continuous open house" form of entertainment, especially during the Program hours during Convention Week. Any other policy would be unfair to Authors, Committeemen, Session Chairmen, and Visiting Foundrymen. The management of Houston hotels have agreed to cooperate with the Officers of AFS in abating unwarranted excessive entertainment which would compete with Society activities and in any way tend to defeat the purposes of the Convention.

Please make Hotel Reservations as shown below:

HOTEL.............................First Choice HOTEL.............................Third Choice

HOTEL.............................Second Choice HOTEL.............................Fourth Choice

No. Rooms with Bath:

.......Single Rooms for.............................persons. Rate preferred $................

.......Twin Bedded Rooms for.............................persons. Rate preferred $................

.......Twin Bedded Rooms Plus Parlor for.............................persons. Rate preferred $................

.......Double Rooms for.............................persons. Rate preferred $................

Arriving May..........approx.......a.m.......p.m....... Leaving May..........a.m.......p.m.......

THE NAME OF EACH HOTEL GUEST MUST BE LISTED

Please include the names of both persons for each twin bedded or double room requested. Also names of all persons for whom you are requesting reservations and who will occupy the rooms asked for:

....

....

....

....

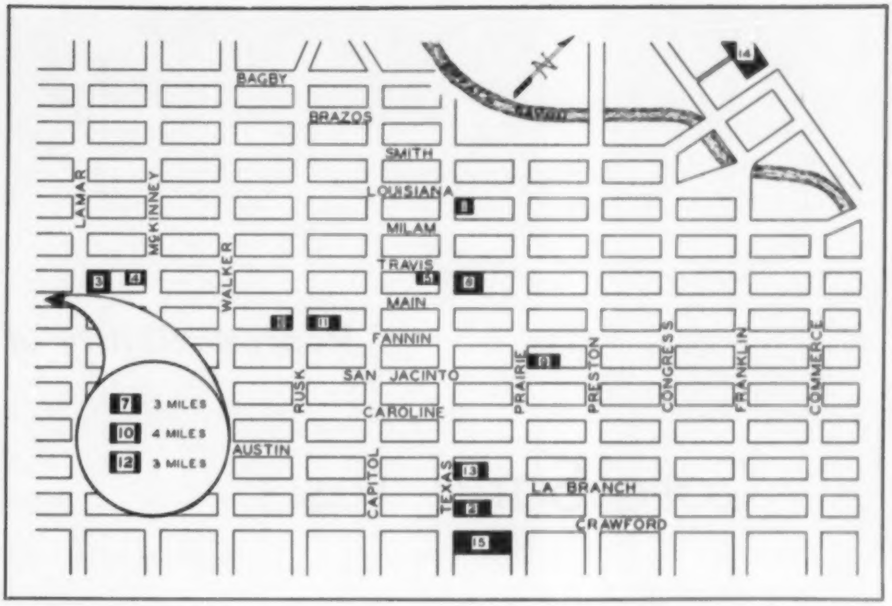
Hotel Rates

in Houston

Key No. Hotel	Single	Double	Twin	Suites
1. AUDITORIUM, Texas at Louisiana......	....	$5.00- 7.00	$6.00- 7.00	....
2. BEN MILAM, Crawford at Texas........	....	6.00-11.00	8.00-12.00	$16.50-20.00
3. LAMAR, Lamar at Main..............	$5.00- 9.00	7.00-12.00	8.50-14.00	16.00-35.00
4. McKINNEY, McKinney near Main.......	4.00- 7.00	6.00- 9.00	8.00-10.00	14.00-16.00
5. MILBY, Texas at Travis.............	2.50- 4.00	3.50- 5.00	5.00- 6.00	....
6. MONTAGU, Fannan at Rusk..........	4.00- 6.00	5.50- 8.00	6.50- 8.00	10.00-12.00
7. PLAZA, 5020 Montrose Blvd..........	5.00- 8.00	7.00-10.00	....	10.00-25.00
8. RICE, Main at Texas................	5.00- 9.50	7.00-11.50	8.50-13.00	17.00-27.00
9. SAM HOUSTON, Prairie at San Jacinto..	3.50- 5.00	5.00- 6.50	6.00- 8.00	....
10. SHAMROCK, Main at Holcombe Blvd....	6.00-14.00	8.00-16.00	8.00-18.00	25.00-55.00
			1 Room Suite (doublettes)	12.00-18.00
11. TEXAS STATE, Fannan at Rusk.........	4.50-11.00	6.50-13.50	7.50-13.50	22.00-27.00
12. WARWICK, Main at Hermann..........	5.00- 6.00	7.00- 8.00	8.00-10.00	12.00-16.00
13. Wm. PENN, La Branch at Texas........	4.00- 4.50	5.50- 7.00	7.00-	....

14. Grand Central Station

15. Union Station



Key numbers correspond to hotel listing shown on facing page.

vention will combine a well-rounded technical program with a number of special activities including a ladies program, post-Convention air line tours of Mexico, plant visits, and Texas Chapter Night. Scheduled for the ladies are a trip on the Houston ship channel, a theater matinee, and a luncheon and style show, in addition to the AFS Tea (Monday May 23). They'll join the men at the Annual Banquet (Wednesday May 25), and Texas Chapter Night (Thursday May 26).

The nine-day air tour of Mexico (about $245) includes visits to key cities, art and cultural centers, and historic sites, a tour of Mexico City night clubs, a bull fight, and optional jungle and fishing trips. Tours are scheduled to leave Houston May 29 and 30. Details can be secured by writing E. R. Brown, Harvey Travel Bureau, 2005 West Gray Ave., Houston 19, or F. M. Wittlinger, Texas Electric Steel Casting Co., Houston.

Other tours can be arranged with National Railways of Mexico through the San Antonio, Texas, office.

Plant visits will include not only foundries but local industries which illustrate how castings are used. The non-foundry visits are planned to bring out product and market development possibilities by illustrating non-cast parts that might be converted to castings.

Texas Chapter Night will feature an outdoor barbecue and the atmosphere of the Old West including—it is rumored—a "court" dispensing justice of the we'll-give-this-horse-thief-a-fair-trial-before-we-hang-him type.

Technical highlights of the 1955 AFS Convention include the official exchange papers from the overseas counterparts of the Society, the H. A. Schwartz Memorial Symposium, a motion picture on the carbon dioxide method of hardening molds and cores, a Symposium on Non-Destructive Testing, a Symposium on Quality Improvement of Molten Iron, and the annual Charles Edgar Hoyt Lecture.

The Hoyt Lecture the morning of Wednesday May 25, will have Fred J. Walls, International Nickel Co., Detroit, as speaker. The lecture will follow the Annual Business Meeting at which AFS President Frank J. Dost, Sterling Foundry Co., Wellington, Ohio, will deliver his presidential address and present cash awards and certificates to top winners in the AFS Apprentice Contest (page 67).

The Schwartz Symposium is a memorial to the late Dr. Schwartz of National Malleable & Steel Castings Co., Cleveland, who headed AFS heat transfer research activities for many years. The symposium, under the sponsorship of the Heat Transfer Committee headed by W. S. Pellini, Naval Research Laboratory, Washington, D.C., will be held on two successive afternoons, Thursday and Friday, May 26 and 27.

The Symposium on Non-Destructive Testing, sponsored in cooperation with the Society for Non-Destructive Testing, is scheduled for the afternoon of Friday May 27. Papers announced by Hans J. Heine, AFS technical director, will describe techniques used by Texas Foundries, Inc., Lufkin, Eastman Kodak Co., Rochester, N.Y., Magnaflux Corp., Chicago, Scullin Steel Co., St. Louis, and Canadian Naval Research Establishment, Halifax, N.S.

The symposium on iron quality improvement will consist primarily of papers on techniques for nitrogen injection of powdered desulphurizers, alloys, and inoculants.

Technical sessions are grouped by foundry interest, as is the custom, to enable foundrymen to attend the maximum number of meetings in the minimum time. Brass and bronze, and light metals sessions are scheduled for the early part of the week; gray iron and steel are scheduled for the middle and latter part. Sand sessions will run throughout the week. Others, such as safety, hygiene, and air pollution control, education, industrial engineering, refractories, and heat transfer are planned for the middle of the week.

The informal round table luncheons and shop course sessions round out the more formal program of prepared papers to give Convention attendants a wide choice of foundry subjects and types of sessions.

O. JAY MYERS / *Tech. Dir., Foundry Products Div. Archer-Daniels-Midland Co., Minneapolis*

Reproducibility of Core Sand Tests

Foundry management will find help in interpreting core test data in this article. Not intended as a panacea, the article deals with the many variables in routine core sand testing, and discusses methods used in the author's laboratory to minimize them.

■ This paper is concerned principally with the variables associated with tensile testing and bakability tests. However, it can be stated at the outset that the author does not believe that full evaluation of a core sand mixture can be made on the basis of baked tensile strength and/or bakability, although both are common "yardsticks" in the foundry industry today.

With the exception of Olmsted,[1] who used shear tests, most workers have used tensile strength evaluation. Murton, Fairfield, and Richardson[2] have outlined a core evaluation method used by the Canadian Department of Mines and Technical Surveys. In correspondence concerning this paper, they concur with the author that both tensile strength and bakability are of limited value in predicting the suitability of a core oil for foundry use.[3]

According to Zirzow,[4] "properties desired in a core are largely determined by its use in the foundry. A core must have sufficient strength to withstand the abuse to which it will be subjected in unloading, transporting to the foundry, and handling by the molder. The core must be capable of resistance to erosion and deformation by the molten metal."

Baked tensile strength and bakability are only indirect measures of core requirements. Better, direct methods must be developed.

Brewster[5] has aptly stated, "To me, the simple room temperature and baked tests, such as moisture, permeability, green compression, tensile, and hardness are chiefly control tests. Regardless of their value in evaluating the suitability of a core, they are the simple watchdogs of the uniformity that must be established even before evaluation takes place and certainly must be maintained afterwards. In addition, strength and bakability are useful in comparing binder performance."

Fig. 1 . . Manual tester for tensiles over 375 psi.

What's a Core? The recently accepted definition of a core:[6] "A mass, molded from a green sand mixture, placed in a mold for the purpose of providing cavities in the casting . . ." infers that:

1. The core must be "capable of being molded in the green state."

2. It must have handlability to be able to be "placed in the mold."

Fig. 2 . . Automatic sieve shaker for screen analysis.

Fig. 3 . . Weighing liquid binder for standard test.

3. It must have enough hot strength to retain its shape during casting solidification "for the purpose of providing (designed) cavities in the castings."

Other necessary qualifications suggested by Caine[7] are:

4. Ability to collapse within a time interval sufficient to prevent hot tearing in those alloys susceptible to this defect.

5. Low or controlled gas content to minimize gas evolution and trapped gas in the metal in those designs susceptible to trapped gas.

Caine states that these latter two points are much more important than mere hot strength.

None of these requisites include either tensile strength or bakability, although both of these tests may be considered as facets of handlability.

Tensile Tests. A core can be considered under tensile stress in a foundry when it is being handled as in pulling from a storage rack, or in carrying by imbedded hooks in the baked sand.

Tensile testing was probably chosen as an index of core value because other industries have used this type of evaluation to advantage and the principles of testing were well-known in these fields, especially in the concrete business. Existing testing equipment in many large foundries usually included a tensile machine and this principle was adapted for the tensile evaluation of cores.

It must be understood that, at best, this test is only a comparative means of evaluating the interstitial bond between the sand grains. The high ratio of surface area, to weight has been considered by some to be the outstanding fault in a tensile briquet.[8] Although tensile testing itself places inherent variations in the way of the tester, the practical variables which confront the sand technician are even more formidable than the theoretical ones.

Testing Variables. Morey[9] has aptly stated that "there are two main reasons for variation in test results. First, there is the material being tested, and second, the methods of testing." To this latter point can be added the inherent precision in the instruments used. Booth[10] has shown that:

1. "When proper consideration is given to sand rammer mountings, repairs . . . much improved results can be expected.

2. "Test procedure for each test must be performed in accordance with detailed instruction.

3. "Quality and design of sand testing equipment must be improved (continuously) to keep in step with the technical development of foundry controls."

This work[10] was performed using green molding sand mixtures. It has been the author's conviction that adding a baking cycle to the already complex sand testing procedures increases many times the chances for a wider spread of test values.

Barnett,[11] in his excellent paper on core ovens, has described the importance of the core baking cycle as it affects not only the production results obtained by the foundry, but also the test results obtained in the laboratory.

In approaching the problem of reproducibility of test results, standardization of testing procedures must be made even in the face of less correlation with foundry practice. Recall, however, that core tensile strength does not represent an important foundry consideration, and that the whole phase of testing cores in this fashion is only to provide a guide for future foundry tests.

To reduce variation when evaluating ingredients for

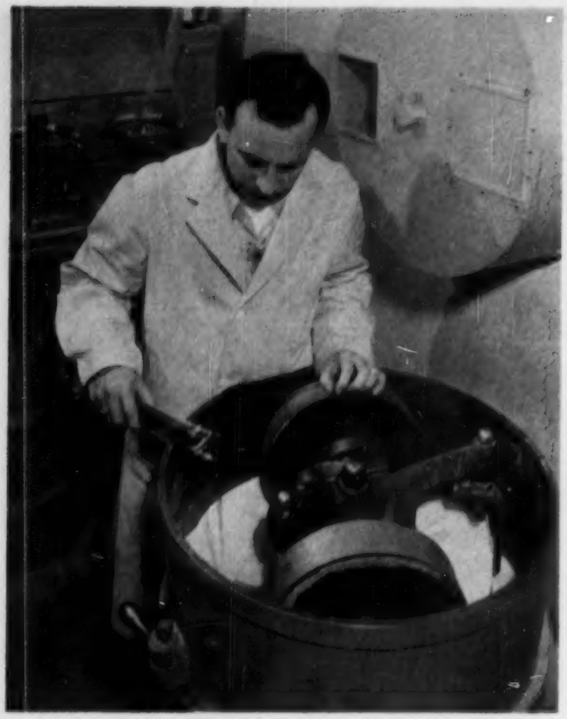


Fig. 4 . . Adding water to sand behind muller wheels.

Fig. 5 . . Green compressive test on core specimen.

possible incorporation in a core sand mixture, we must deal at one time with the least number of ingredients possible. The principal component of a foundry core is a mass of sand grains, the surface of which is subsequently covered with a film of binder.

Sand Used. The sand itself must be completely standardized, in order to obtain reproducible data. If we were to use production foundry sand, we would have to standardize the following potential variables: (1) The percentage of minerals other than quartz; (2) Internal (fracture) surfaces; (3) Cleavages; (4) Grain size; (5) Grain distribution; (6) Grain surface (cleanliness, smoothness); (7) Clay and fines content; (8) Base moisture; and (9) Handling segregation.

The foundry industry has at its disposal a Standard Testing Sand which assures elimination of most of these variables. Examples of three screen analyses in Table 1 show the reproductibility to be expected from various shipments of this material. Our laboratory has found that variation in Standard Sand is due more to mechanical sieving difficulties than to the sand itself. This statement is elaborately verified by Walker's[12] work on sand. Uniformity of the sieves, method of sampling, time of sieving, and weight of sample must all be taken into account. Such additional precautions as these must also be considered during sieve analysis: (1) Cleanliness of the sieves; (2) Type of shaker; (3) Method of cleaning the screens; (4) Method of transferring sand to the balance; and (5) Sensitivity of the balance.

Some authorities recommend the purchase of a standard set of sieves to check from time to time against those used in production. The sieve wire tends to wear during use due to the abrasive action of the sand grains and this wear can only be checked by using a standard.

Table 1 . . AFS (50-70) Standard Sand Screen Analyses

U.S. Series No.	Per Cent Retained		
	Sample 1	Sample 2	Sample 3
40	none	none	none
50	0.4	tr	0.2
70	97.7	96.3	97.7
100	1.9	3.7	2.1
140	none	none	none

Table 2 . . AFS Reference Linseed Oil Specification

Specific Gravity	0.931 - 0.935
Average lb/gal (77 F)	7.71
Saponification Value	190 - 194
Iodine No. (Wijs)	178 - 182
Acid No.	2 - 4
Color (Gardner)	5 max.
Viscosity (Gardner-Holdt)	A_1 - A
Moisture	0.1 per cent max.

Much variation in analyses can be attributed to the opening between adjacent screens. "For instance the 50 mesh screen has an opening of 0.295 mm and the 70 mesh screen has an opening of 0.208 mm. Hence it is possible for the 70 mesh screen to retain grains having diameters from 0.295 mm to 0.209 mm. Yet all these grains would be considered 50 mesh. The surface area of grain 0.295 mm in diameter is greater than the surface area of a grain 0.209 mm in diameter. However, an equal weight of the grains with the smaller diameter would have more surface area than an equal weight of the grains with the larger diameter. Hence, it is theoretically possible to have two sands which

have the same amount of sand retained on the various screens to produce different results even though they are alike in all other respects."[13]

This laboratory's practice is to omit the AFS clay separation when sieving AFS Standard Sand. A 50 gm sample is placed in the upper sieve of a nest of clean sieves on a mechanical tapping machine and automatically shaken for exactly 15 minutes. The individual sieves are then carefully brushed down on stiff paper, transferred to a delicate balance, and weighed to the nearest 0.01 gm. Simple mathematical conversions to per cent are made by dividing the sum of the weights of the grains retained on the individual screens into the weight of the grains retained on each sieve, then multiplying this number by 100. Reruns are made if the total weight does not fall between 49.75 and 50.25 gms.

Binders. The simplest core sand mixture to make is one composed of just sand grains and the binder; however, if we were to use only these two ingredients, poor data reproductibility would result. There would be insufficient green bond to keep the test cores from cracking and sagging prior to baking. Standard Sand bonded only with normal, non-viscous core oils tends to form a sticky mixture, which, despite cleaning of the pattern, tends to cling to the sides of the tensile briquet forms when drawing them from the briquet.

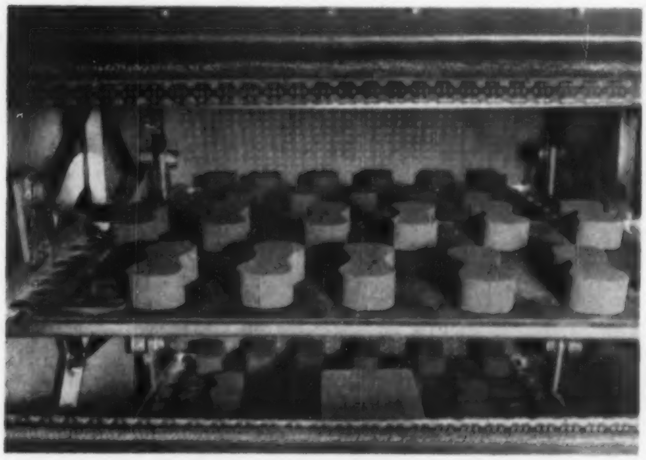


Fig. 6 . . Cores are baked in electric reel-type oven.

This creates enough stress in the center of a core made from such a mixture to cause the core to crack longitudinally.

When a water-soluble synthetic resin is the binder to be tested, cores can be made without the use of any other material since moisture is carried into the mixture by the resin solution. Since water-soluble binders tend to move from the center of the core to the surface in cores containing no other additives such as cereal, true tensile strength values are not obtainable from baking such core sand mixtures.

Water. The easiest and most obvious binder to use to overcome the green strength deficiency of the core sand mixture bonded with core oil, is water. The relatively high surface tension of water holds the sand grains in a rigid position for moldability. For control of the variations in the mineral content and pH of water, it has been our practice to use only distilled water in the mixture. The pH of distilled water from our still varies between 6.25 and 6.50.

The temperature of the water must also be controlled. Any large change in the water temperature will be reflected in its evaporation rate from the mixture, and, therefore, the moisture content of the mixture. It is our practice to keep five gallons of distilled water in a closed glass container near the mixer to avoid use of warm, freshly distilled water. Where no distilled water is available, as in most foundries, it is imperative that a supply of tap water be set aside to keep away from wide temperature variations.

Reference Oil. In checking an unknown liquid binder, all materials other than the binder itself must be rigidly controlled—the sand is standardized, and the water is distilled. A Reference Linseed Oil with the guaranteed analysis shown in Table 2 is at the disposal of the foundry industry. It is the "standard binder" which can be used to check the many variables in core processing. This binder is not suggested for use as a standard for the evaluation of other binders since it is not representative of either a core oil or a synthetic resin. Its main purpose is to provide a standard material for checking reproductibility of core tests.

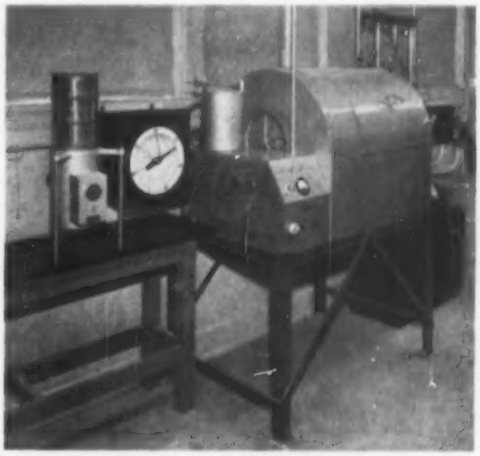


Fig. 7 . . Oven with recording temp. controller.

Weighing. Once the materials are standardized, it remains to attack Morey's[9] second point, i.e., "methods of testing." It is of primary importance to weigh the ingredients that compose the mixture and, for this reason, the scales and balances used must be accurate. One of the greatest sources of error in sand testing lies in poor measurements—not necessarily due to inaccurate equipment, but rather, to poor technique and housekeeping which results in dirty, dusty balances, and weighing on improperly leveled instruments.

The types of heavy-duty laboratory balances to be used are determined, to a large extent, by the working capacity of the muller. Our muller operates at peak efficiency with a 10,000-gm load, and, for this reason, we have been using a 20-kg capacity balance which is accurate to one gram.

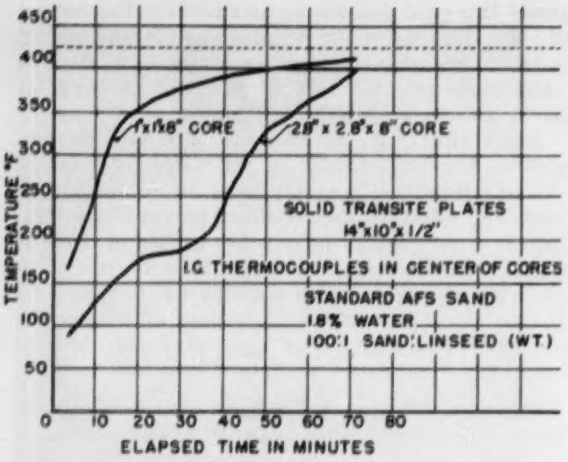


Fig. 8 . . Graph of time required for a large and a small core to come to temperature shows why range in core size determines optimum baking temperature.

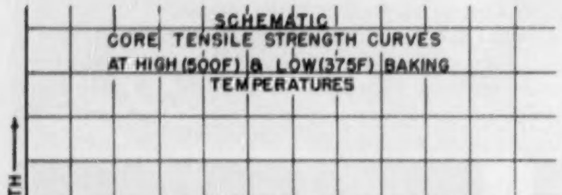


Fig. 9 . . High and low baking temperatures produce same ultimate strengths with different baking times.

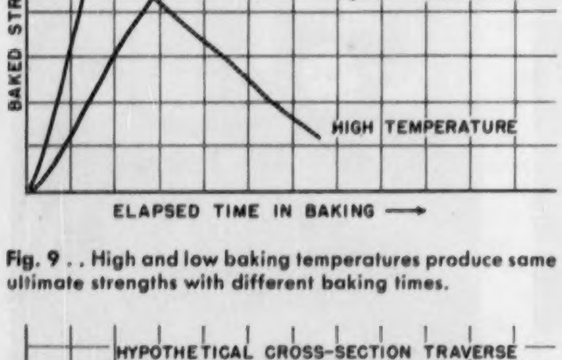
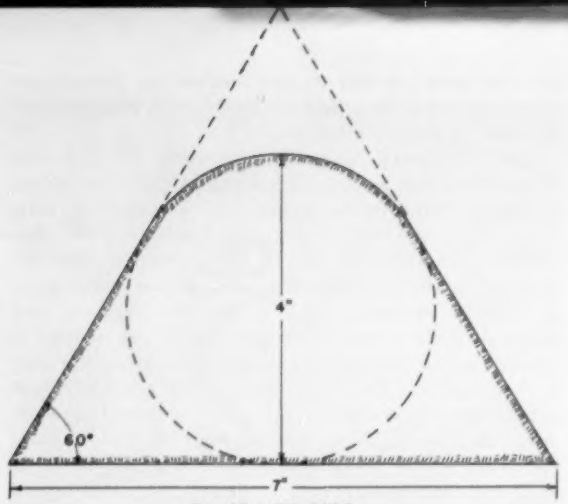


Fig. 10 . . The center of the bakability core has a higher baked strength than either the top or bottom.



BAKABILITY CORE
(MAJOR VERTICAL SECTION)

Since one milliliter of water weighs one gram (for all practical purposes), it has been our practice to add the distilled water by volume to the sand in the mixer. In the case of liquid binders of varying densities, it is imperative that they be weighed because their weight per unit volume varies with the material. Our practice also takes into consideration the weight of the material which clings to the side of the container when the binder is poured out of the container into the wet sand.

The scale for weighing the binders is a metric balance with a 4.5 kg capacity and 10 mg sensitivity. A smaller balance (2 kg capacity, 10 mg sensitivity) is used to weigh the green core sand mixture before forming briquettes.

Mixing. The sand mixer is a very important item in core sand testing. The following points must be held constant for each test: (1) Conditioning of the mixing surfaces; (2) R.p.m. of machine; (3) Plow and wheel adjustments; and (4) Mixing cycle.

Before each test, our mixer is conditioned and cleaned with the following mixture: 80% lake sand (GFN 45-55), 6½% western bentonite, 8% tap water, and 5½% kerosene. The cleaning mixture is discharged from the machine and all sand is removed from the rubber-coated pan and from the plows before mixing. This mixture can be stored for a long period of time, retempered, and reused. This same cleaning mixture is used at the end of the work day to clean the muller and prevent its rusting overnight.

The plows are set as close to the sides and center post as possible (without actual contact) and they sweep the sand clean as they are driven along the pan. The wheels are set about ⅛ in. from the bottom to prevent them from abrading and crushing the sand. The muller turns at 40 rpm.

In blending our standard sand, water, and binder in our covered muller, the procedure is as follows:

1. Weigh exactly 10,000 gm of dry AFS Standard (50-70) Testing Sand into a tared container.
2. Transfer the weighed sand to a 24-in. diameter muller.
3. Rotate the plows through a few revolutions so that the sand is distributed evenly over the bottom of the pan.

Fig. 11 (left) . . Geometrical development of bakability core.

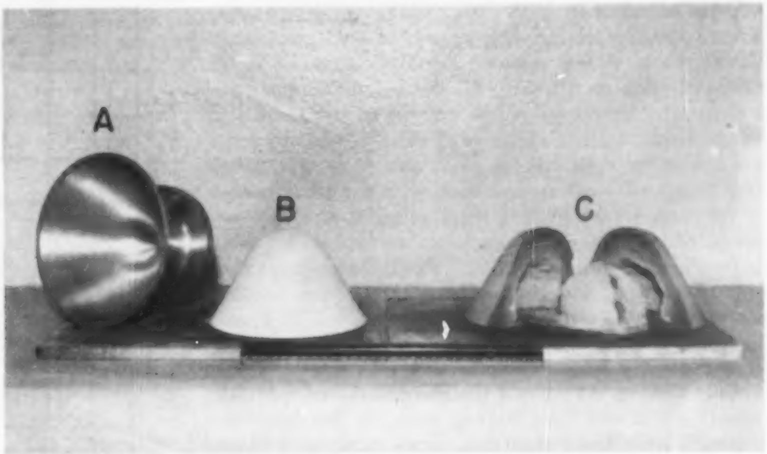


Fig. 12 (right) . . A, bakability core box; B, green core; C, baked and sectioned core ready for testing.

4. Measure exactly 200 ml of room temperature distilled water into a 250-ml glass graduate.

5. Tare a 150-ml glass beaker whose sides have been "wet" with the oil to be tested.

6. Weigh exactly 100 gm of the oil to be tested in the prepared beaker.

7. Pour the distilled water into the sand behind the muller wheels.

8. Mix the sand and water 3 minutes, scrape down sides, wheels and plows.

9. Form a sand "pocket" behind each muller wheel by lightly pressing down the wet sand. Pour half of the 100 gm of oil into each of the sand "pockets." Tare the beaker back to the original weight. If not quite 100 gm have been placed in the muller, it is an easy operation to pour more in and retare the beaker. If too much is in the muller, some can be removed from the puddle in the pocket—by the use of a spatula—before it soaks into the sand.

Carefully cover the sand "pockets" containing oil with wet sand to prevent muller wheels from picking up oil during first revolution of the machine.

Mix the sand for 3 minutes; interrupt cycle, repeat as in Step 8; remix for three more minutes. (Total mixing time: water, 3 minutes; oil, 6 minutes.)

10. Discharge the mixture into a container and keep this container covered until the sand is to be used.

Green Properties. Although a core sand mixture is never intentionally founded in the green state, the unbaked properties are usually obtained for the purpose of checking the mixture. Moisture determinations are made with a calcium carbide-type moisture tester, rather than a hot-air circulating blower. The chemical method is preferred since the volatile thinners present in some liquid oil binders tend to codistill with the water despite a thermostatically controlled temperature.

With a batch of standard sand weighing 10,000 gm to which is added 200 ml of water and 100 gm of liquid binder, the theoretical moisture present is 1.94 per cent; however, rarely is more than 1.5 per cent actual moisture present in the mixture. Some water is lost through evaporation, but much more is left on the sides, plows, wheels, and pan of the mixing equipment during mulling.

When green compressive strength tests are performed, they are performed with a Saeger 3.0 psi green compressive strength tester. A green core strength accessory for use with the universal testing machine is available. This equipment eliminates the handling of the specimen prior to testing since it is stripped in place at the machine. Permeability tests are never performed on test specimens molded from the green standard sand mixture since it is felt that this test is only one of sand fineness and moisture content. Standard sand controls the fineness and the moisture tests take care of the other factor. Woodliff[8] has noted that permeability is useful because it reflects rammed density changes. The weight of our tensile briquet serves this purpose.

Tensile Tests. It has been our practice to weigh exactly that amount of sand necessary to make an AFS standard tensile briquet in the forming of each core. Three drops of the standard rammer weight are used. Approximately 100-104 gm of sand is necessary, this value varying slightly with the lubricity of the liquid binder being tested. Precautions must be taken to assure calibrated weights for the leveled balance. Formed metal funnels (fitting into the tensile pattern hopper) prevent the loss of weighed sand during transfer from the scale to the pattern.

The tensile specimen rammer must be lubricated with oil (not graphite) and the rotating cam kept in good condition. The specimen is rammed slowly and deliberately three times, allowing the weight to come to rest between blows. The rammer head must be clean to assure a smooth surface on the top of the briquet. A properly mounted rammer can be calibrated with master proving rings to determine whether or not it is functioning satisfactorily.

After ramming the sand, the hopper is lifted from the pattern. The core box, containing the rammed briquet, is carefully lifted and transferred to a non-perforated transite core plate ½ in. thick and 18 x 9 in. in size. (The AFS practice is to bake cores on small ⅛ in.-thick steel plates.) The composition and weight of the core plate has a great deal of influence on the speed of baking.

Tests have shown[14] that higher ultimate tensile strengths are attainable when baking cores on alu-

minum plates than with cast iron or transite plates. The cast iron plates cause cores to bake out appreciably slower than either transite or aluminum. This is primarily due to the weight (and attendant heat absorption) of cast iron plates (20 lb) of the same size as the transite cited above (4½ lb). At least 10 cores are made for each baking cycle and they are placed in a staggered position as indicated in the photograph.

We have shown[15] that there is no appreciable decrease of tensile strength correlatable to standing time before baking despite ambient room temperature conditions between 19 per cent and 25 per cent relative humidities at a temperature range between 74 F and 82 F.

Core Baking. AFS has a tentative standard specification[16] for a test core baking oven. It has been the author's experience that this rotary table unit leaves much to be desired in both ease of operation, control of temperature, and consistency of results from cores baked therein.

A reel-type, well-insulated, electronically controlled laboratory core-baking oven is now available and this piece of equipment has been found to be far superior to that which conforms to the tentative standard. It has been our practice to use electrical resistance heating elements as the source of heat, despite the fact that we are certain that the products of combustion which emanate from organic fuels influence the baking of cores. The reason for using the electric reel oven for our standard tests is that we have one less variable to control, i.e., these combustion products.

At what temperature should the cores be baked? Some binders call for a "low" baking temperature, while others, a "moderate" one. It is our feeling that the oven temperature has only an indirect influence on the baking of cores. The *core* temperature is the important factor and it directly affects the bond developed.

D. C. Williams has carefully noted the difference which exists between the temperature of a controller and that of a specimen. He has stated,[17] "The term 'temperature control setting' . . . is used because the writer feels that the potentiometer registers only a compromise temperature between the temperature of the element and the specimen."

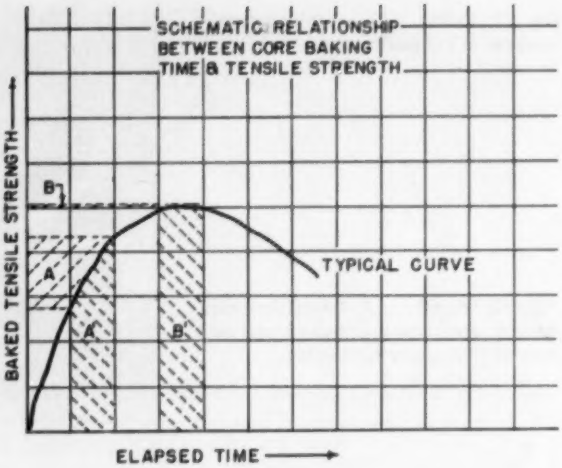
In a conventional core baking oven, the core temperature is controlled by time more than any other factor. The time that the cores are in the oven at, say, 425 F will determine the core temperature. If the core is on a heavy rack on a transite plate in a densely loaded oven, the core temperature may not rise above 212 F for, say, 10 minutes. If, on the other hand, the core is suspended in a large empty oven with good circulation, it may reach 300 F in the same time.

Our practice is to preheat the oven to 50 F above the desired core baking temperature for the following reasons:

1. To make certain all parts in the oven have been thoroughly soaked.

2. To make up for temperature drop caused when opening the oven for loading.

It has been said that there is an optimum baking temperature for all binders. The author feels that there is a critical temperature above which the bond



deteriorates, but that, by controlling the time of baking, the bonding film can be kept from breaking down despite the temperature of the oven.[18] For instance, urea-formaldehyde binder disintegrates at a relatively low temperature, yet it can be properly baked in an oven at 500 F if the time factor is critically controlled so that the core temperature does not exceed, say, 350 F. Of course, the higher the temperature, the more critical the time control must be. If the oven were set at 400 F, then the cores could be withdrawn over a period of, say, 10 minutes without fear of losing ultimate bond, while with a temperature setting at 500 F, the critical time range would be about one to two minutes.

In foundry practice, when large and small cores are baked in a production oven at the same time, the small cores reach temperature appreciably faster than the large ones (Fig. 8) and the danger of overbaking these cores is a real one. The range in size, then, of cores being baked simultaneously determines the optimum oven temperature setting.

It has long been thought that a lower baking temperature will produce stronger cores.[19] However, the plateau of a tensile-time curve is much flatter when a lower temperature is used, and, therefore, it is easier to obtain the ultimate tensile strength over a predetermined baking cycle. This does not mean (Fig. 9) that the cores baked at the higher temperature did not reach the same ultimate strength.

In the above diagram, the cores baked at the lower temperature tested stronger because of the baking cycle followed. However, if the cores were withdrawn on a different cycle, the ultimate strength of the bond could be shown to be comparable regardless of the baking temperature.

In laboratory practice, the use of a moderate temperature will allow more leeway in obtaining the ultimate tensile strengths of binders. We use 425 F for a cycle of 30, 60, 90, and 120 minutes. If no true peak tensile strength is shown during this test, the temperature of baking is lowered or raised, depending on whether the highest strength is at 30 or 120 minutes. It should be stressed that no true ultimate tensile can be extrapolated from a curve which has no defined peak. Such a value must be determined by additional tests at another temperature.

Fig. 13 (left) . . Small differences in shorter baking times make large variations in tensile strength.

Fig. 14 (right) . . Average of over 2000 tensile tests on a mixture bonded with Reference Linseed Oil.

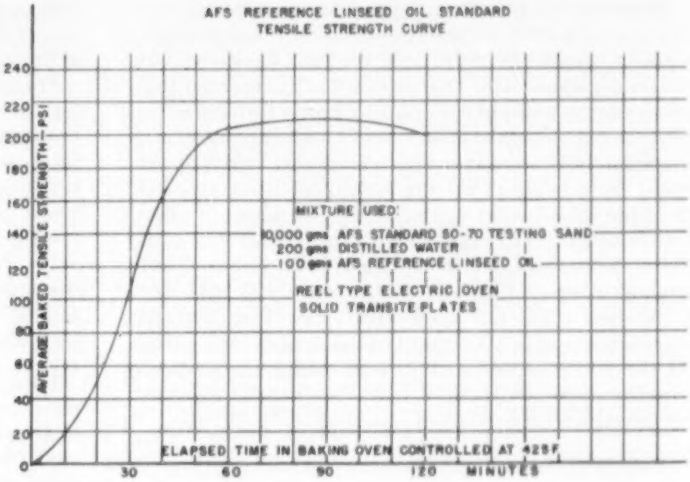
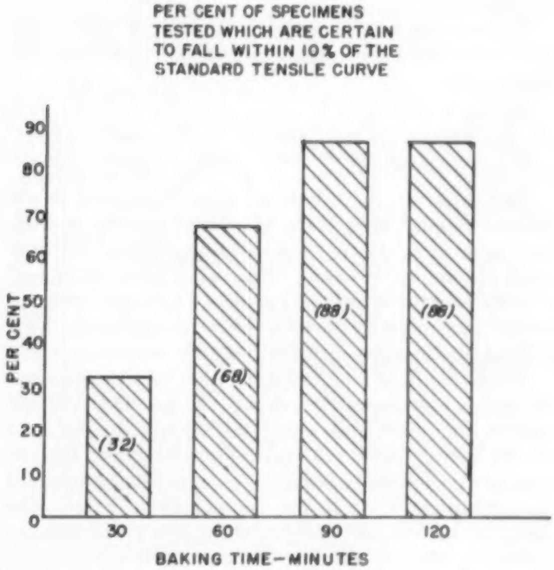


Fig. 15 (below) . . Test accuracy is better for longer baking times.



Another point easily overlooked is that cores are actually baking even after having been withdrawn from the core oven. All during the time that the cores are above, say, 400 F, film curing is taking place.

Some foundries have adopted a practice of using a broad survey of the temperature-time relationship of binders by using a cycle of, say, 45 minutes at 350 F and 400 F; 75 minutes at 400 F and 425 F; and 105 minutes at 450 F. One of the major fallacies in this type of test is that the complete baking cycle is never set forth. For this reason, the peak or ultimate tensile strength may not be obtained and the maximum binder value is not always recorded. Of course, the best test would be to perform the complete baking cycle at each temperature. Indications derived from the short, single cycle test cited above should be corroborated by a regular tensile curve test.

Core Identification. When the cores have been removed from the oven, it has been found advisable to identify their top side by marking it with a grease pencil.

In a conventional oven, the cores bake from the outside toward the center. The plate upon which the cores rest heats up slowly as the cores are being baked. When the top of the core is, say, 150 F, the bottom of the core is usually much lower. Furthermore, the sides and top of the core are constantly "washed" with the circulating hot air in the core oven, and the products of distillation are being swept away while the base of the core is "stagnant." If a tensile strength curve could be drawn across a core section (at "peak" time and temperature) we would have a plot something like Fig. 10.

This strength differential across the section of the specimens causes inaccurate readings unless the core is put into the jaws of the tensile machine in the same manner. It is our practice to place the core in the jaws with the plate side toward the outside.

Testing Specimens. The specimens are tested on the universal testing machine and the individual results of each of the cores from each baking period are arithmetically averaged as in the following example:

1.

Specimen No.	Testing Machine Reading
1	52.6
2	53.0
3	53.0
4	48.7
6	48.3
8	52.3
10	48.9
Total	498.8

2. Arithmetical average 49.9
3. 10 per cent of average 5.0
4. Upper limit (average + 10 per cent of average) = 49.9 + 5.0 = 54.9
5. Lower limit (average — 10 per cent of average) = 49.9 — 5.0 = 44.9
6. Eliminate specimens No. 5 and 9 (less than lower limit)
7. Eliminate specimen No. 7 (over upper limit)
8. Re-average remaining seven specimens: 356.8 ÷ 7 = 50.9
9. Tensile strength = average × 5 = 50.9 × 5 = 225 psi.

Humidity Control. One of the most aggravating factors in core testing is the effect of meteorological conditions on the results of the tests. We have not shown any direct argument with Dietert[20] who h is reported that the absolute humidity of the air directly influences the core baked strength. It has been our experience that high humidity tends to shift the tensile curve to the right by slowing down the baking of the cores (inhibiting moisture evaporation) but it does not affect ultimate tensile strength. It is a positive fact that cores bake out slower on heavy humid days, but, given enough time and air circulation, they will bake out.

As soon as the hot test briquets have been marked, they are stored in air-tight glass desiccators for cooling. If the cores are allowed to cool under the ambient conditions of the room, erratic data can be expected (especially with overbaked briquets).

Bakability Tests. The bakability of a core is indirectly a measure of its: (1) Plate side pastability; (2) Potential gas; and (3) Ease of knockout. Bakability tests are performed concurrently with the tensile testing of cores. This test has evolved from the original work performed by Woodliff[21] and Harjie wherein they state that "core oils either have it or do not have it and the 'it' applies to the 'ability of the core to bake uniformly throughout'." The size of the core used was a 3¼-in. cube.

Woodliff[22] baked his core for that time necessary to cure raw linseed at 425 F (98-100 per cent) and he refers his unknown liquid binder to this standard, stating that the "arbitrary limit for core oil bakability is 90 per cent."

In using the described mixture, the green strength is so low that many cube cores tended to slump at the corners during handling prior to baking. For this reason, a dome or bell-shaped core was designed for use in our laboratory. The development of the core is shown in Fig. 11, and a photograph of the core box is shown in Fig. 12.

The core sand (about 1800 gm) is densely rammed into the box, which is inverted on a plate, and then drawn from the sand core. It is imperative to place the bakability specimen in the same respective place each time in the oven to assure reproducible results. Forty-five minutes baking at 425 F is usually a satisfactory cycle.

This test is mainly one of thermoplasticity. The cores are bisected (by cutting them vertically) immediately after removing them from the hot oven. The outer baked shell separates from the inner unbaked ball of sand easily when Standard Sand is used. The sand is allowed to cool. The weights of both the whole core and the baked shell are determined to the nearest gram. By dividing the grams of baked sand by the total grams of core sand after baking (and multiplying by 100) the "per cent baked" is determined.

When core exhibiting poor bakability are used in the foundry, it is difficult to paste them together on their plate sides. The unbaked surfaces (rather than the paste) fail during handling.

Any organic binder will produce gas, and the less cured (or set) the binder is, the more potential gas is available to cause casting blows. The amount of gas generated, and its rate of evolution, is not only a function of the core bakability, but also of the temperature of the metal and the metal section at that point.

Finally, it is possible to correlate bakability with ease of core knockout—especially with light, non-ferrous alloys. If the core is not properly baked in the core oven, it will bake during founding. Instead of breaking down, the bonding film builds up and inhibits proper removal of the sand debris from the casting cavity.

We have found no correlation between a tensile strength curve and bakability. Therefore, when discussing speed of bake of a binder, both factors must be taken into account.

Data. Despite all of the precautions listed in this report, together with exact control on every test, our work with mixtures bonded with AFS Reference Linseed Oil, Standard Sand, and distilled water leaves much to be desired as far as absolute reproducibility is concerned.

The average tensile strengths (to the nearest 5 psi) over more than two year's operation (2000-plus briquets) are:

Baking Time, minutes at 425 F	30	60	90	120
Baked Tensile, psi	105	205	210	200

The variation in individual tests is greatest at the shortest baking time. This is understandable because the curve (Fig. 13) is steepest at that point and any small differences in baking time will make a great deal of difference in tensile strength. At a longer time interval (i.e., 60 minutes) the effect of the same time difference is hardly noticeable on the tensile strength.

In our group of 30-minute baking period specimens, the range is between 80 psi and 130 psi. Only 32 per cent of the specimens tested fell within 10 per cent of the average (105-115 psi). The range for the 60-minute specimens is much narrower, 68 per cent of them falling within 10 per cent of the average. The range of the 90 and 120-minute specimens is similar (190-230; 180-220) and 88 per cent of them fall within 10 per cent of the average.

Figure 14 shows the values to be expected in the tensile testing of mixtures bonded with Reference Linseed Oil. Figure 15 depicts the percentage of specimens certain to fall within 10 per cent of the weighted average tensile curve.

Calculations made according to the aforecited paper by Morey[9] on the precision of sand test data showed a standard deviation of about 10 psi throughout the curve. This means that approximately 70 per cent of all individual briquets would fall within ± 10 psi, 95 per cent would be within ± 20 psi, and 99.7 per cent within ± 30 psi. The bakability dome cores baked for 45 minutes at 425 F show a range between 65 per cent and 75 per cent under these conditions.

Conclusions. Much is left to be desired in core sand testing. Not only are the tensile and bakability tests only an indirect measure of foundry conditions, but more important, they are difficult to reproduce.

The sand technician, often unappreciated, expends a great deal of time and energy in providing management with as accurate data as possible. These data can

be intelligently employed if they are used as a means for comparing similar types of binders to each other.

However, the interpretation of these room temperature tests must be made with caution. Until we are able to evaluate core sands in the laboratory under more typical foundry conditions of elevated temperatures and molten metal envelopes, we cannot dogmatically condemn one material and recommend another.

Acknowledgement

Extensive use has been made in this report of data gathered from many AFS technical committee meetings. Special acknowledgement should be made of the assistance rendered and review made by: L. P. Robinson, Archer-Daniels-Midland Co.; R. J. Mulligan, Archer-Daniels-Midland Co.; F. S. Brewster, Harry W. Dietert Co.; Harry W. Dietert, Harry W. Dietert Co.; G. J. Grott, Unitcast Corporation; H. J. Heine, technical director, AFS; A. E. Murton, Canadian Department of Mines and Technical Surveys; B. Richardson, Canadian Department of Mines and Technical Surveys; C. A. Sanders, American Colloid Co.; D. C. Williams, Ohio State University; E. E. Woodliff, Foundry Sand Service Engineering Co.; and E. C. Zirzow, Werner G. Smith Co., Inc.

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Calendar of Future Meetings and Exhibits

1955
February

10-11 . . Wisconsin Regional Foundry Conference
Hotel Schroeder, Milwaukee. Sponsored by AFS Wisconsin Chapter.

14-17 . . Industrial Ventilation Conference
Michigan State College, East Lansing, Mich.

14-18 . . American Institute of Mining & Metallurgical Engineers
Conrad Hilton Hotel, Chicago. Annual Meeting.

17-18 . . Southeastern Regional Foundry Conference
Tutwiler Hotel, Birmingham, Ala. Sponsored by AFS Birmingham and Tennessee Chapters.

March

8-10 . . Instrument Society of America
Hotel William Penn, Pittsburgh. Fifth Annual "Instrumentation in the Iron and Steel Industry" Conference.

9-10 . . Foundry Educational Foundation
Hotel Cleveland, Cleveland. College-Industry Conference.

14-15 . . Steel Founders' Society of America
Drake Hotel, Chicago. Annual Meeting.

14-18 . . American Society of Tool Engineers
Shrine Auditorium, Los Angeles. First Western Industrial Exposition.

25-26 . . California Regional Foundry Conference
Huntington Hotel, Pasadena, Calif. Sponsored by AFS Northern California and Southern California Chapters.

28-Apr. 1 . . American Society for Metals
Pan-Pacific Auditorium, Los Angeles. Ninth Western Metal Congress and Western Metal Exposition.

April

7-8 . . Malleable Founders' Society
Edgewater Beach Hotel, Chicago. Market Development Conference.

18-19 . . Third National Air Pollution Symposium
Pasadena, Calif.

May

6 . . American Association of Spectrographers
Chicago. Sixth Annual Conference.

16-20 . . Sixth National Materials Handling Exposition
International Amphitheater, Chicago.

22-26 . . Air Pollution Control Association
Detroit. Forty-eighth Annual Meeting.

23-27 . . American Foundrymen's Society
Houston, Texas. 59th Annual Convention. Non-Exhibit.

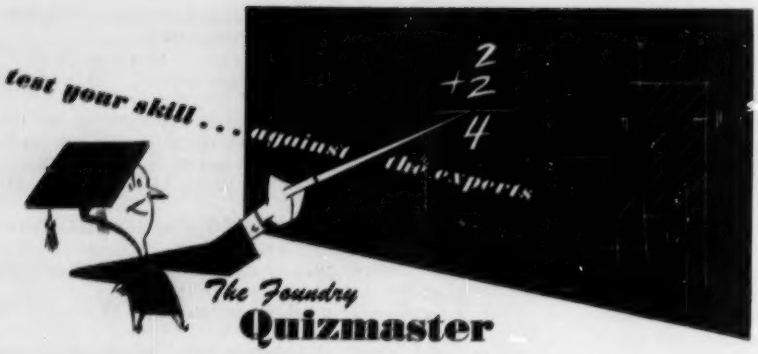
31-June 3 . . Third Basic Materials Exposition
Convention Hall, Philadelphia.

June

8-10 . . American Welding Society
Municipal Auditorium, Kansas City. Third Annual Welding Show.

15-17 . . American Society of Training Directors
Ambassador Hotel, Los Angeles. Annual Convention.

16-18 . . Malleable Founders' Society
The Greenbrier, White Sulphur Springs, W. Va. Annual Meeting.



Crucible Care

John G. Matchulat *Electro Refractories & Abrasives Corp.*

■ Crucibles are as rugged and efficient as modern industrial science can make them, but their maximum life can be obtained only through proper care and maintenance.

Clay-bonded graphite and the more rugged, carbon-bonded silicon carbide crucibles are the two major types used in the foundry for melting and pouring. Circle the correct answer or answers and check against those on page 90.

1. To determine if a crucible has been cracked by rough handling: (a) inspect it closely. (b) tap it and listen to the sound. (c) run fingers over the surface.

2. Crucibles are best stored before using in: (a) warm, dry place. (b) unheated room or shed. (c) highly humid area.

3. When using a clay-bonded graphite crucible: (a) bring to temperature slowly. (b) bring to temperature immediately. (c) speed heating for larger sizes.

4. When using a carbon-bonded silicon carbide crucible: (a) bring to temperature quickly. (b) bring to temperature slowly. (c) preheat the furnace for 15 min.

5. Using a half-full crucible: (a) wastes useable capacity. (b) cracks the crucible. (c) shortens crucible life.

6. When ingots are wedged tightly with scrap in a crucible: (a) melting is much slower. (b) metal expansion is apt to crack the crucible. (c) it is being used efficiently.

7. The crucible should be charged with: (a) regular scrap. (b) preheated scrap. (c) makes no difference.

8. Keep the crucible in the furnace until: (a) molds are ready and it is convenient to pour. (b) pouring temperature has been reached. (c) pouring temperature has been maintained for some time.

9. Pouring temperatures for light castings with thin sections should be: (a) same as for heavier section castings. (c) hotter. (c) colder.

10. Crucibles should be cleaned: (a) just before shutdown time. (b) after three or four heats. (c) after each heat.

11. When oxides build up inside a crucible the: (a) volume is seriously reduced. (b) layer acts as an insulant. (c) crucible will crack.

12. Best time to add flux is: (a) with the charge. (b) just before pouring. (c) any time during the melting cycle.

13. To keep the crucible from sticking to the base block, separate them with: (a) heat-resistant lubricant. (b) cardboard. (c) sand.

14. Slag build-up on the bottom of the furnace shortens crucible life by: (a) destructive chemical reaction. (b) reducing combustion space and prolonging heating. (c) diverting flame onto the crucible.

15. Should metal be allowed to freeze in the bottom of crucibles? (a) yes. (b) no. (c) makes no difference.

16. Crucibles should be charged only with thoroughly dry scrap because: (a) moisture will reduce furnace temperature. (b) moisture will oxidize the crucible. (c) molten metal may erupt from the crucible.

17. Each alloy should have its own crucible because: (a) varying melting temperatures of different alloys spoil the crucible. (b) metal contamination must be avoided. (c) each alloy calls for a special kind of refractory material.

Pouring 5 per cent-titanium aluminum alloy from a crucible furnace.


Bruce L. Simpson


Frank W. Shipley


O. Jay Myers


Richard A. Oster

Nominate New AFS Officers and Directors

Bruce L. Simpson, president, National Engineering Co., Chicago, has been nominated for the presidency of the American Foundrymen's Society for 1955-56. Now vice-president, he was named to succeed the present president, Frank J. Dost, president, Sterling Foundry Co., Wellington, Ohio, by the Nominating Committee in Chicago, December 9.

Frank W. Shipley, foundry manager, Caterpillar Tractor Co., Peoria, Ill., was named to succeed Mr. Simpson as vice-president for 1955-56. Mr. Shipley was a national director of AFS from 1950 to 1953.

Six men nominated to serve as national directors for three-year terms are:

C. W. Gilchrist, foundry superintendent, Cooper-Bessemer Corp., Mt. Vernon, Ohio, representing Gray Iron (Chapter Group G—Central Ohio Chapter).

Charles E. Nelson, technical director, Dow Chemical Co., Midland, Mich., representing Light Metals (Chapter Group I—Saginaw Valley Chapter).

O. Jay Myers, technical director, Foundry Products Div., Archer-Daniels-Midland Co., Minneapolis, Minn., representing Supplies (Chapter Group L—Twin City Chapter).

Richard A. Oster, director, Beloit Vocational & Adult School, Beloit, Wis., representing Education (Chapter Group M—Northern Illinois-Southern Wisconsin Chapter).

Curtis C. Drake, plant superintendent, Griffin Wheel Co., Denver, Colo., representing Gray Iron (Chapter Group N—Timberline Chapter).

Robert W. Trimble, foundry superintendent, Bethlehem Supply Co., Tulsa, Okla., representing Gray Iron (Chapter Group P—Tri-State Chapter).

President Dost, automatically becomes a director for one year.

Incoming officers and directors take office the day after the close of the Annual Meeting.

Up to 45 days prior to the date of the Annual Business Meeting, additional nominations may be made by written petition signed by 200 members in good standing and filed with the AFS Secretary, according to the By-Laws.

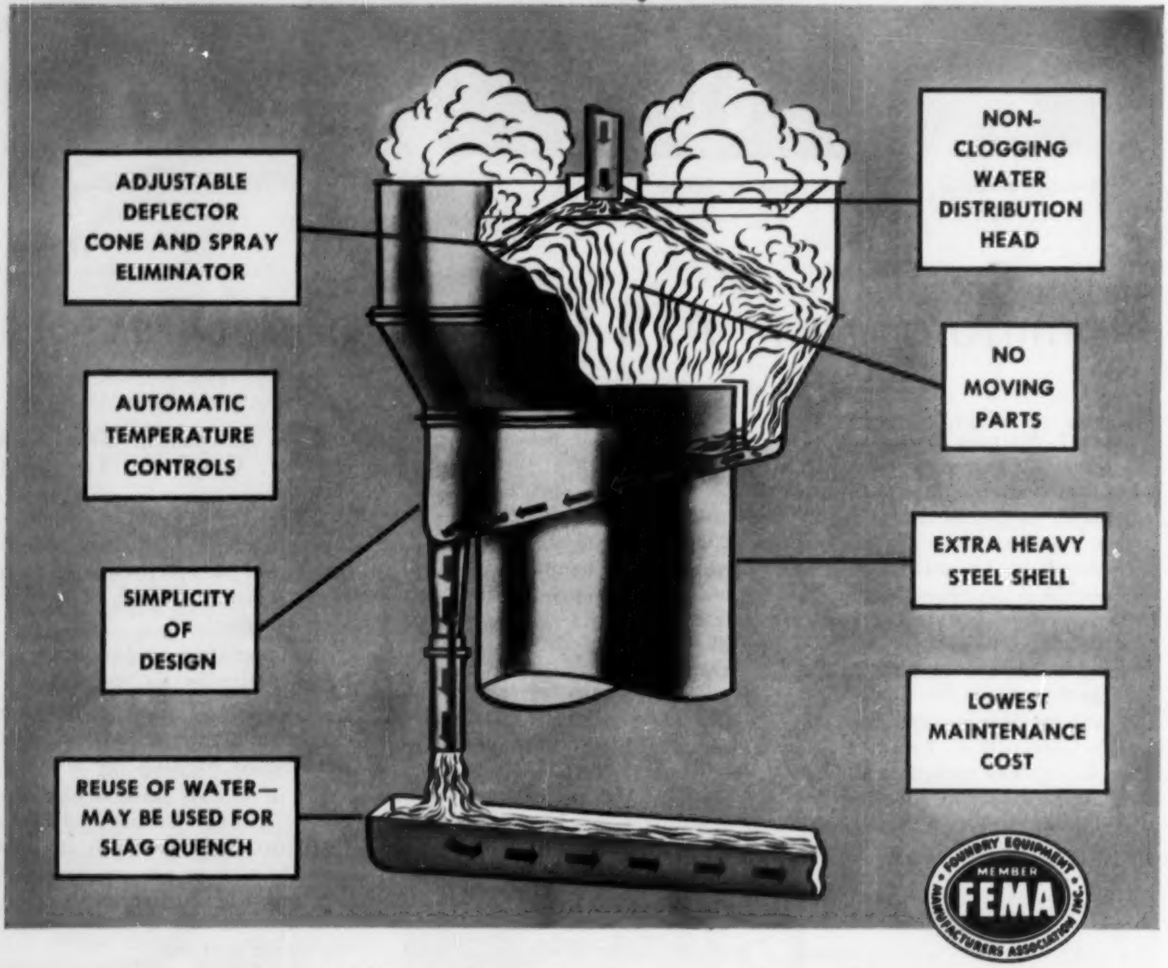

Charles E. Nelson


Robert W. Trimble


Curtis C. Drake


C. W. Gilchrist

What to look for in the cupola collector you may buy!



Here you can see the simplicity of the Schneible Cupola Collector, type "SW".

The success of this collector is the result of scores of years of research and far-sighted planning to provide equipment to meet today's demands for simple, efficient fly-ash control in our modern foundries. This collector also conforms to most codes throughout the country.

For simplicity and efficiency of operation the "SW" Cupola Collector has no equal. Schneible patented features assure the lowest possible maintenance cost and a longer, more useful life.

It will pay you to check with your local Schneible representative or, if you like, call us collect at the main office.

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Apprentice applies wax fillet to pattern as he completes entry for the AFS Apprentice Contest of a previous year.

Set Apprentice Contest Deadline

WITH deadline for the 1955 AFS Apprentice Contest set at April 1, learners, trainees, students, and apprentices have less than two months left to enter the competition. Patterns for the molding divisions and blueprints and other materials for the patternmaking divisions should be requested promptly, however, to allow ample time for shipping entries to Chicago where judging on a national level will take place.

The annual competition—now in its 32nd year—has been broadened for 1955 to include not only bona fide apprentices but also learners, trainees, and students. Contest regulations state that any learner or trainee in the all-around practices of the trade who has not had over five years experience in the pattern trade nor more than four years in the foundry trade is an eligible contestant. It is not necessary for a contestant or his company to be affiliated with AFS to be eligible.

Students of trade, vocational, or high schools shall be eligible to enter the individual chapter contests at the discretion of the chapter involved. Such entries, if successful in chapter competition, shall be considered on an equal basis with other entries.

The amount of apprentice training completed has no bearing on eligibility for the contest and is not considered in the judging.

Cash prizes totaling $875 and certificates of recognition are awarded for the first ($100), second ($50), and third ($25) place winners in each of five divisions – Wood Patternmaking, Metal Patternmaking, Iron Molding, Steel Molding, and Non-Ferrous Molding.

Those interested in entering the contest should contact the Education Committee of the nearest AFS chapter or write to: Ashley B. Sinnett, Education Director, American Foundrymen's Society, Golf & Wolf Roads, Des Plaines, Ill.

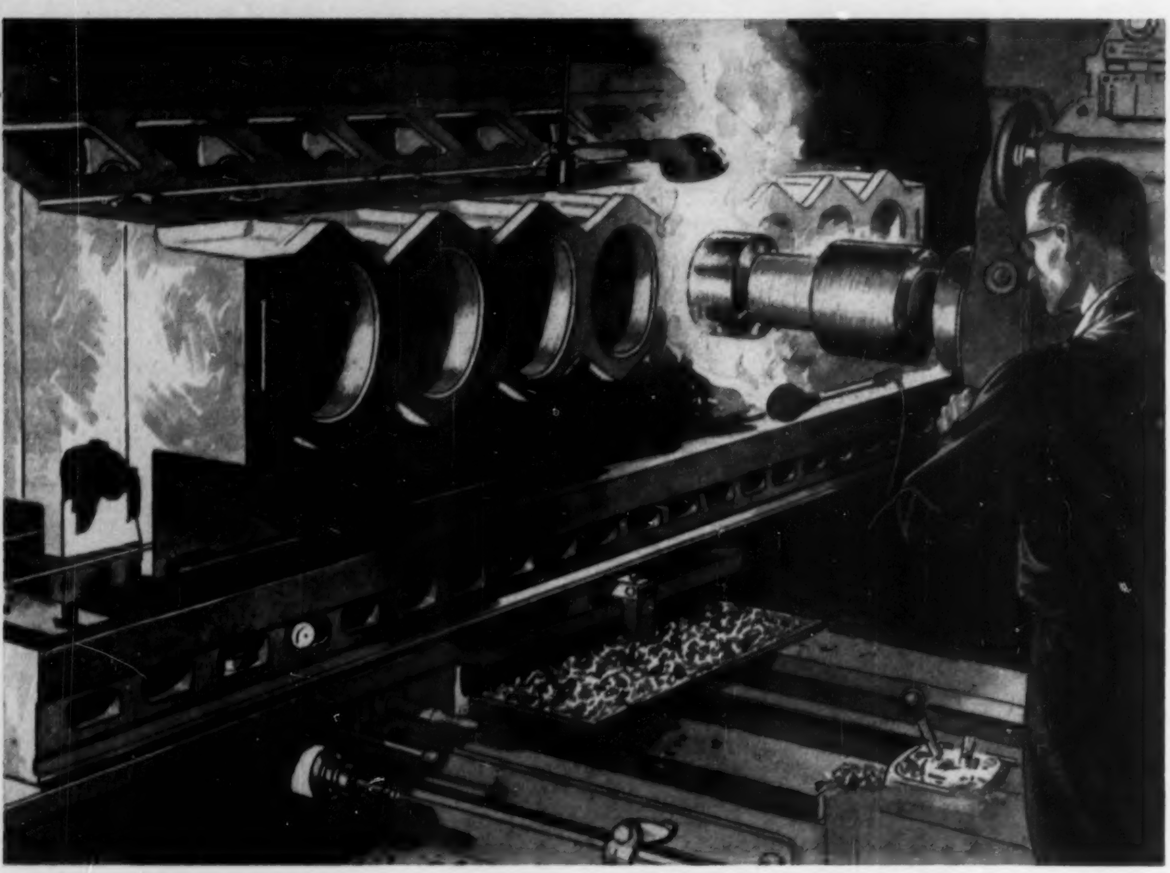
Canadian companies or individuals interested in entering the contest should write directly to G. E. Tait, Manager of Foundries, Dominion Engineering Works, Ltd., Box 220, Montreal, Que., Canada. Mr. Tait can supply all the information and contest materials; it is not necessary for Canadian contestants to contact AFS Headquarters first.

Ten AFS chapters which already have organized local contests are: Detroit, Eastern Canada, Metropolitan, Northern Illinois-Southern Wisconsin, Oregon, Saginaw Valley, Southern California, St. Louis, Washington, and Wisconsin.

Companies with a number of eligible contestants may organize plant contests with the winners being entered directly in the national contest. Eighteen local plant contests have been set up and others are expected to come in in time to meet the deadline of April 1.

All castings and patterns made for entry in the national judging should be boxed and sent *prepaid* to arrive at the following address by April 1: Prof. R. W. Schroeder, General Engineering Dept., University of Illinois, Pier 47, Navy Pier, Chicago, Ill.

Judges consider merits of molding entries in Non-Ferrous Div. of AFS Apprentice Contest.



Insure good machinability with as little as 2 to 4 lb. of SMZ alloy per ton of Iron

Today's high-speed machining operations make it more important than ever to control the structure of iron castings. Castings with chilled corners and edges or hard spots may cause costly tool breakage and interrupted production.

An effective, low-cost method of insuring satisfactory machinability is the addition of SMZ alloy to the iron in the ladle. An addition of only 2 to 4 lb. per ton of iron is sufficient to reduce chill, control the uniformity of structure, and produce castings with excellent machinability.

SMZ alloy is a balanced inoculant containing 60 to 65 per cent silicon, 5 to 7 per cent manganese, and 5 to 7 per cent zirconium. Further information about the advantages of using SMZ alloy will be gladly furnished on request. The ELECTROMET office nearest you will be pleased to answer your inquiry.

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Foundry Facts

Pig Iron Specifications

Based on *Steel Products Manual*, Section 1, of the American Iron & Steel Institute. Second half will appear in the March issue.

■ Pig iron is the term applied to iron produced by the reduction of iron ores in the blast furnace. The term "pig iron" was derived from the peculiar arrangement of the molds in the early method of casting in a sand bed. The resultant shapes, suitable for handling, into which the metal was cast were called pigs. The product of that casting method, now almost obsolete, was known as sand cast pig iron. The common method used now is that of casting the iron into metal molds or chills, thus eliminating sand that always adhered to sand cast pigs. The product of that method is known as chill cast or machine cast pig iron.

When iron from the blast furnace is held in a molten condition for charging into steelmaking furnaces or for pouring directly in certain foundry practice, it is commonly referred to as hot metal.

A varied and rather complex nomenclature, now obsolete, was applied to the old fracture test method of grading sand cast pig iron. It included the appearance of the fracture, numerical designation of grades, and geographical districts in which the different grades were produced.

That method of grading did not closely relate chemical composition to the end use to which pig iron was to be put, and gave rise to continual controversies due to human error in classifying one or more samples. As time went on, that method of grading was supplanted by a more logical, yet complex, method of differentiating grades of pig iron by method of manufacture, by end purpose for which it was intended, and by generic chemical composition.

Method of manufacture differentiated among pig irons as (1) coke iron smelted with coke and always with hot blast; (2) anthracite iron smelted with anthracite coal mixed with coke and with hot blast; and (3) charcoal iron smelted with charcoal with either hot or cold blast.

Intended use differentiated among pig irons as basic iron for making basic open hearth steel; bessemer iron for making bessemer steel; foundry iron for general casting purposes; and malleable iron for making malleable castings.

Chemical composition differentiated among the several irons by using a chemical characteristic of the iron as a title, such as *low phosphorus iron* or *high silicon iron.*

Even such methods of grading permitted uncertainties, and a standard method of grading pig iron according to its content of significant chemical elements, silicon, sulphur, phosphorus and manganese, was found to be a necessity. The end use to which the iron is to be put determines the amount of each element.

The grades of pig iron listed as standard are those produced and stocked to the full and unrestricted ranges of the chemistry specified for standard irons.

The compositions listed in the several tables are identified by a series of letters and numbers descriptive of chemical analysis and indicative of intended use.

Differences in phosphorus and manganese contents constitute the main distinctions between the classes intended for different purposes. The silicon limits or ranges also vary within the different classes and are the controlling consideration in grading the product within a class.

The chemical composition of pig iron is dependent to a large degree upon the chemical composition of the raw materials which are available to the blast furnace. Adjustment of the quantity of any element present in pig iron is possible but within rather narrow limits. For example, the quantities of manganese, phosphorus and sulphur cannot be reduced from the normal quantities delivered by the materials used in burdening the furnace. These elements can be adjusted upwards, however, by proper raw material additions to the furnace burden. Silicon can be adjusted both by operating conditions and raw materials.

The carbon content of pig iron is not controllable within close limits, and it is therefore not customary to specify carbon limits.

For convenient reference, standard grades of pig iron listed herein are designated by the use of prefix letters, suffix letters and numerals.

Prefix Letter Designations. For convenience of reference herein, a prefix letter is used which designates grades in order of increasing phosphorus content, as follows:

Code	*Designation*	*Phosphorus Content, %*
LP	Low phosphorus	0.035 max.
LPi	Intermediate low phosphorus	0.036 to 0.075
Bes	Bessemer	0.076 to 0.100
M	Malleable	0.101 to 0.300
B	Basic—Northern	0.400 max.
Fl	Foundry—Northern, low phosphorus	0.300 to 0.500
Fh	Foundry—Northern, high phosphorus	0.501 to 0.700
Fs	Foundry—Southern	0.700 to 0.900
Bs	Basic—Southern	0.700 to 0.900
S	Silvery	0.300 max.

Numerals. *Silicon* and *manganese* contents are designated by a six-number system in which the first three numerals designate the average silicon content; the average manganese content is similarly indicated by the last three numerals.

Example: LP 113088

LP denotes *phosphorus content of 0.035 per cent maximum*
113 denotes *silicon content of 1.00 to 1.25 per cent*
088 denotes *manganese content of 0.76 to 1.00 per cent*

Suffix Letter Designations. Modifications of chemical composition are indicated *after the numerals* as follows:

m indicates a modified *manganese* range
s indicates a modified *silicon* range

Table 1 . . Low Phosphorus Iron

Grade Designation	Composition, per cent			
	Si	S Max.	P Max.	Mn
LP 063075m	0.50/0.75	0.035	0.035	0.75 max.
LP 088075m	0.76/1.00	0.035	0.035	0.75 max.
LP 113075m	1.01/1.25	0.035	0.035	0.75 max.
LP 138075m	1.26/1.50	0.035	0.035	0.75 max.
LP 163075m	1.51/1.75	0.035	0.035	0.75 max.
LP 188075m	1.76/2.00	0.035	0.035	0.75 max.
LP 213075m	2.01/2.25	0.035	0.035	0.75 max.
LP 238075m	2.26/2.50	0.035	0.035	0.75 max.
LP 263075m	2.51/2.75	0.035	0.035	0.75 max.
LP 288075m	2.76/3.00	0.035	0.035	0.75 max.
LP 113088	1.00/1.25	0.035	0.035	0.76/1.00
LP 138088	1.26/1.50	0.035	0.035	0.76/1.00
LP 163088	1.51/1.75	0.035	0.035	0.76/1.00
LP 188088	1.76/2.00	0.035	0.035	0.76/1.00
LP 213088	2.01/2.25	0.035	0.035	0.76/1.00
LP 238088	2.26/2.50	0.035	0.035	0.76/1.00
LP 263088	2.51/2.75	0.035	0.035	0.76/1.00
LP 288088	2.76/3.00	0.035	0.035	0.76/1.00
LP 113113	1.00/1.25	0.035	0.035	1.01/1.25
LP 138113	1.26/1.50	0.035	0.035	1.01/1.25
LP 163113	1.51/1.75	0.035	0.035	1.01/1.25
LP 188113	1.76/2.00	0.035	0.035	1.01/1.25
LP 213113	2.01/2.25	0.035	0.035	1.01/1.25
LP 238113	2.26/2.50	0.035	0.035	1.01/1.25
LP 263113	2.51/2.75	0.035	0.035	1.01/1.25
LP 288113	2.76/3.00	0.035	0.035	1.01/1.25

Foundry Facts

Pig Iron Specifications

Definitions and Lists of Standard Grades

LP Phosphorus 0.035 (Table 1) Maximum, generally termed *special low phosphorus pig iron* is used in making acid open hearth and other kinds of steel required to have an especially low phosphorus content. In manufacturing this grade of iron, ore, coke and limestone must be especially selected for low phosphorus content. It is used in gray iron foundries and steel foundries in the manufacture of rolls, castings for the chemical industry, high tensile brake drums for trucks, glass molds, brake cylinder liners, diesel engine castings, automotive dies and chilled iron castings.

Table 2 . . Intermediate Low Phosphorus Iron

Grade Designation	Composition, per cent			
	Si	S Max.	P	Mn
LPi 113075m	1.00/1.25	0.05	0.036/0.075	0.75 max.
LPi 138075m	1.26/1.50	0.05	0.036/0.075	0.75 max.
LPi 163075m	1.51/1.75	0.05	0.036/0.075	0.75 max.
LPi 188075m	1.76/2.00	0.05	0.036/0.075	0.75 max.
LPi 213075m	2.01/2.25	0.05	0.036/0.075	0.75 max.
LPi 238075m	2.26/2.50	0.05	0.036/0.075	0.75 max.
LPi 263075m	2.51/2.75	0.05	0.036/0.075	0.75 max.
LPi 288075m	2.76/3.00	0.05	0.036/0.075	0.75 max.
LPi 113088	1.00/1.25	0.05	0.036/0.075	0.76/1.00
LPi 138088	1.26/1.50	0.05	0.036/0.075	0.76/1.00
LPi 163088	1.51/1.75	0.05	0.036/0.075	0.76/1.00
LPi 188088	1.76/2.00	0.05	0.036/0.075	0.76/1.00
LPi 213088	2.01/2.25	0.05	0.036/0.075	0.76/1.00
LPi 238088	2.26/2.50	0.05	0.036/0.075	0.76/1.00
LPi 263088	2.51/2.75	0.05	0.036/0.075	0.76/1.00
LPi 288088	2.76/3.00	0.05	0.036/0.075	0.76/1.00
LPi 113113	1.00/1.25	0.05	0.036/0.075	1.01/1.25
LPi 138113	1.26/1.50	0.05	0.036/0.075	1.01/1.25
LPi 163113	1.51/1.75	0.05	0.036/0.075	1.01/1.25
LPi 188113	1.76/2.00	0.05	0.036/0.075	1.01/1.25
LPi 213113	2.01/2.25	0.05	0.036/0.075	1.01/1.25
LPi 238113	2.26/2.50	0.05	0.036/0.075	1.01/1.25
LPi 263113	2.51/2.75	0.05	0.036/0.075	1.01/1.25
LPi 288113	2.76/3.00	0.05	0.036/0.075	1.01/1.25

LPi Phosphorus 0.036 to 0.075 (Table 2) is used when extremely low phosphorus is not necessary, but when a phosphorus content lower than that of the Bes grade is desired.

Bes Phosphorus 0.076 to 0.100 (Table 3) has as its distinguishing chemical characteristic a phosphorus content which is sufficiently low for the manufacture of steel by the acid bessemer process. As phosphorus is not eliminated by the smelting process of the blast furnace, or by the bessemer process of steelmaking, ores low in that element must be selected for the manufacture of bessemer iron.

This class of iron is used by steel producers nearly always as hot metal in making acid bessemer steel. It is sometimes used in making acid open hearth steel when a phosphorus content in the steel somewhat higher than that obtained by the use of the LP class is tolerable. The principal merchant use of iron of the Bes class is in making iron ingot molds and rolls.

The quantity of bessemer pig iron which can be produced in the United States is limited by the quantities of ore of proper grade which are available. Because limited quantities of bessemer grade ore are available, it is difficult to produce the full range of chemical compositions and adjustment of the chemical composition is not always economically feasible.

Table 3 . . Bessemer Iron

Grade Designation	Composition, per cent			
	Si	S Max.	P	Mn
Bes 113100m	1.00/1.25	0.05	0.076/0.100	1.00 max.
Bes 138100m	1.26/1.50	0.05	0.076/0.100	1.00 max.
Bes 163100m	1.51/1.75	0.05	0.076/0.100	1.00 max.
Bes 188100m	1.76/2.00	0.05	0.076/0.100	1.00 max.
Bes 213100m	2.01/2.25	0.05	0.076/0.100	1.00 max.
Bes 238100m	2.26/2.50	0.05	0.076/0.100	1.00 max.
Bes 263100m	2.51/2.75	0.05	0.076/0.100	1.00 max.
Bes 288100m	2.76/3.00	0.05	0.076/0.100	1.00 max.
Bes 113113	1.00/1.25	0.05	0.076/0.100	1.01/1.25
Bes 138113	1.26/1.50	0.05	0.076/0.100	1.01/1.25
Bes 163113	1.51/1.75	0.05	0.076/0.100	1.01/1.25
Bes 188113	1.76/2.00	0.05	0.076/0.100	1.01/1.25
Bes 213113	2.01/2.25	0.05	0.076/0.100	1.01/1.25
Bes 238113	2.26/2.50	0.05	0.076/0.100	1.01/1.25
Bes 263113	2.51/2.75	0.05	0.076/0.100	1.01/1.25
Bes 288113	2.76/3.00	0.05	0.076/0.100	1.01/1.25

M Phosphorus 0.101 to 0.300 (Table 4) is used for the production of malleable iron and for the manufacture of gray iron castings when a lower phosphorus content is desired than is furnished in the Fl, Fh, or Fs classes. It provides a phosphorus content intermediate between that of the Bes and Fl classes.

Table 4 . . Malleable Iron

Grade Designation	Composition, per cent			
	Si	S Max.	P	Mn
M 088063	0.75/1.00	0.05	0.101/0.300	0.50/0.75
M 113063	1.01/1.25	0.05	0.101/0.300	0.50/0.75
M 138063	1.26/1.50	0.05	0.101/0.300	0.50/0.75
M 163063	1.51/1.75	0.05	0.101/0.300	0.50/0.75
M 188063	1.76/2.00	0.05	0.101/0.300	0.50/0.75
M 213063	2.01/2.25	0.05	0.101/0.300	0.50/0.75
M 238063	2.26/2.50	0.05	0.101/0.300	0.50/0.75
M 263063	2.51/2.75	0.05	0.101/0.300	0.50/0.75
M 288063	2.76/3.00	0.05	0.101/0.300	0.50/0.75
M 313063	3.01/3.25	0.05	0.101/0.300	0.50/0.75
M 338063	3.26/3.50	0.05	0.101/0.300	0.50/0.75
M 088088	0.75/1.00	0.05	0.101/0.300	0.76/1.00
M 113088	1.01/1.25	0.05	0.101/0.300	0.76/1.00
M 138088	1.26/1.50	0.05	0.101/0.300	0.76/1.00
M 163088	1.51/1.75	0.05	0.101/0.300	0.76/1.00
M 188088	1.76/2.00	0.05	0.101/0.300	0.76/1.00
M 213088	2.01/2.25	0.05	0.101/0.300	0.76/1.00
M 238088	2.26/2.50	0.05	0.101/0.300	0.76/1.00
M 263088	2.51/2.75	0.05	0.101/0.300	0.76/1.00
M 288088	2.76/3.00	0.05	0.101/0.300	0.76/1.00
M 313088	3.01/3.25	0.05	0.101/0.300	0.76/1.00
M 338088	3.26/3.50	0.05	0.101/0.300	0.76/1.00
M 088113	0.75/1.00	0.05	0.101/0.300	1.01/1.25
M 113113	1.01/1.25	0.05	0.101/0.300	1.01/1.25
M 138113	1.26/1.50	0.05	0.101/0.300	1.01/1.25
M 163113	1.51/1.75	0.05	0.101/0.300	1.01/1.25
M 188113	1.76/2.00	0.05	0.101/0.300	1.01/1.25
M 213113	2.01/2.25	0.05	0.101/0.300	1.01/1.25
M 238113	2.26/2.50	0.05	0.101/0.300	1.01/1.25
M 263113	2.51/2.75	0.05	0.101/0.300	1.01/1.25
M 288113	2.76/3.00	0.05	0.101/0.300	1.01/1.25
M 313113	3.01/3.25	0.05	0.101/0.300	1.01/1.25
M 338113	3.26/3.50	0.05	0.101/0.300	1.01/1.25

Hold Twelfth Electric Furnace Steel Conference

HANS J. HEINE / *Technical Director, American Foundrymen's Society*

THE Twelfth Annual Electric Furnace Steel Conference sponsored by the Electric Furnace Steel Committee of the American Institute of Mining & Metallurgical Engineers' Iron & Steel Div., was held at the William Penn Hotel in Pittsburgh, Pa., December 1-3, 1954. Plant visits were held the first day. The second and third were devoted to technical sessions dealing with vacuum melting, refractories, acid and basic electric steel making practice, quality control, and ladle practice. In addition, an opportunity was provided at the close of the technical meeting to engage in questions and answers on special problems not included in the formal program as well as general casting problems.

First Session on Vacuum Melting

At the first session, on recent developments in vacuum melting, co-chairmen were W. M. Farnsworth, Republic Steel Corp., Massillon, Ohio, and R. J. Wilcox, Michigan Steel Castings Co., Detroit. J. H. Moore, Vacuum Metals Corp., Cambridge, Mass., stated that the three most important metal property improvements which can be achieved by vacuum melting are freedom from inclusions, elimination of gases, notably nitrogen and hydrogen, and better composition control. Moore pointed out that vacuum melted ferritic stainless steels exhibit no transition from ductile to brittle failure until about —50 F, while ordinarily these alloys are brittle not only at room temperature but appreciably above it. He said an improvement in room temperature impact strength of almost 50 to 1 could be achieved for these steels through vacuum melting. By comparing the rupture life and ductility for air and vacuum melted specimens of a nickel-base precipitation hardening alloy, Moore demonstrated desirable properties obtained by the vacuum process.

Pilot Scale Experiences Discussed

R. K. McKechnie, General Electric Co., Schenectady, N. Y., covered the reasons for vacuum melting and discussed his organization's experience on a pilot scale. He gave examples of much improved properties through vacuum melting.

E. M. Mahla, E. I. du Pont de Nemours & Co., Newport, Del., predicted a bright future for vacuum melted metals in the chemical industry. Benefits appear to be associated with transverse fatigue properties, high quality surfaces free from inclusions, and exceptional corrosion resistance. Mahla intimated that the chemical industry would be justified in using vacuum melted steels for high-pressure equipment and many other applications where fatigue failures are a problem.

H. H. Scholefield, Telegraph Construction & Maintenance Co., London, England, reviewed the history and practice of vacuum melting in Europe by following the development of equipment from its inception about 1920 to the latest high-vacuum, high-frequency melting furnaces now in use. Design problems and the difficulties in selecting the right pumping equipment were explained. Operational conditions and procedures are governed by the metals and alloys being poured, concluded Scholefield.

A refractory and masonry session had as co-chairmen D. L. Clark, Simonds Saw & Steel Co., Lockport, N. Y., and L. W. Cashdollar, Pittsburgh Metallurgical Co., Pittsburgh, Pa. M. P. Fedock, Republic Steel Corp., Canton, Ohio, evaluated the performance of electric arc furnace refractories based on his earlier work relating to corrosiveness of various melting practices with refractories. Fedock showed roof and sidewall performance based on his method of evaluation in which five major groups of melting practices were used as a basis for slagging conditions to which refractories are subjected. Data on bottom and ladle lining performance were also evaluated by this method. He noted the dependence of refractory consumption on melting practice and furnace size.

R. P. Hill, Sharon Steel Corp., Lowellville, Ohio, discussed the practice used at his plant. He warned of the possibility of damage caused by an explosion, after shutdown, due to water in wet banks and bottom.

Authors of other papers dealing with bottom and sidewall materials and maintenance, roof construction, and the effect

Here's How Oklahoma Steel Castings Co., Tulsa, Okla., saves $945 per month in core rod material and straightens 2400 rods in 3.8 hours, a job they were previously unable to keep up with in an eight-hour day. This is accomplished by the use of the Rodmizer, which is handled by the Hydro-Blast Corp., Chicago. Unit straightens and sorts to length, rods ¼, ½, ⅜, and ¾ in. diameter, and sorts 10 in. up to 36 in. It will handle rods up to 50 in. long. The operator cannot catch his fingers in the equipment. Suction pulling of rods through straightening dies prevents drawing rod when obstructed. *Oklahoma Steel Castings Co., Inc.*

For more facts, use Reader Service card, p. 17-18

of intermittent operations on electric furnace refractories were: H. C. Bigge, Bethlehem Steel Co., Bethlehem, Pa.; A. C. Ogan, U. S. Steel Corp., Duquesne, Pa.; J. E. Harrod, U. S. Steel Corp, Chicago; R. J. McCurdy, Republic Steel Corp., Chicago; K. L. Grant, Bethlehem Pacific Coast Steel Co., Los Angeles; and A. K. Blough, Republic Steel Corp, Canton, Ohio.

C. G. Mickelson, American Steel Foundries, East Chicago, Ind., and V. E. Zang, Unitcast Corp., Toledo, Ohio, were co-chairmen of the metallurgical session on melting, which dealt with basic and acid electric steel melting practice as well as an evaluation of several melting practices for high alloy steels.

C. C. Wissmann, Los Angeles Steel Castings Co., Los Angeles, reviewed acid electric steel making practice with special reference to the aspects of oxidation. After defining the degree of oxidation, the speaker discussed the effect of early oxidation on hydrogen and the value of oxygen as a practical dehydrogenizer. He also discussed the effect of slag composition on the absorption of hydrogen, the effect of oxygen on melting variables, and the effect of slag on oxidation. The oxidizing or deoxidizing effect of gaseous oxygen on the heat, during the boil, is determined by the conditions under which it is used, Wissmann concluded.

Harold C. Templeton, Lebanon Steel Foundry, Lebanon, Pa., described his company's practice in melting high alloy steel in the basic arc furnace. He said the bottom and sides up to the slag line, of the top charged furnaces, are lined with rammed magnesite over burned magnesite brick; above that the lining is chemically bonded magnesite brick, metal encased. The arch is of chrome magnesite burned brick. Templeton said single slag melting practice is used for high alloy steels, with carbon reduced by injection of gaseous oxygen.

P. R. Gouwens, Fahralloy Co., Harvey, Ill., talking on melting practice for high alloys, presented operating data for three melting practices used in the same furnace; acid dead melting, acid oxygen, and modified basic oxygen. Gouwens found dead melting to have inherent limitations, and the oxidation loss of chromium and manganese to be high in both acid practices. As far as could be determined, he said neither gaseous oxygen process had a deleterious effect on the physical properties of the alloys. Gouwens said slag fluidity needs more study.

Co-chairmen of a session on quality were G. G. Zipf, Babcock & Wilcox Co., Beaver Falls, Pa., and R. B. Shaw, Allegheny Ludlum Steel Corp., Brackenridge, Pa. The following topics were discussed: *"The Fluorescent X-Ray Spectrometer, A New Tool for Rapid Analysis Determinations,"* in papers by Howard Pickett, Industrial Products Section, General Electric Co., Milwaukee, by M. F. Hasler and J. B. Rittenhouse, Applied Research Laboratories, Glendale, Calif., and by D. C. Miller, North American Phillips Co., Mt. Vernon, N. Y.; *"Use of Reusable Insulated Low Volume C & D Hot Tops for Yield Improvement,"* by J. C. Carpenter, Ferro Engineering Co., Cleveland; and *"New Approach to Exothermic Hot Topping of Ingots,"* by Michael Bock, II, Exomet Inc., Conneaut, Ohio.

"Application of Special Minor Elements to Electric Furnace Steels," was presented by A. J. Scheid, Jr., and W. J. Mathews, Columbia Tool Steel Co., Chicago Heights, Ill. The authors outlined use of special elements such as aluminum, boron, calcium, cerium and other rare earth metals, selenium, sodium, titanium, zirconium, phosphorous, and sulphur. They suggested procedures for making these additives most effective. They classified the use of special elements with respect to hydrogen elimination, special deoxidation, carbide stabilization, and effect on hardenability and machinability.

Session on Foundry Melting

C. B. Williams, Massillon Steel Castings Co., Massillon, Ohio, and C. W. Vokac, Whiting Corp., Harvey, Ill., were co-chairmen of a session on foundry melting operations. V. E. Belusko, Electric Steel Foundry Co., Portland, Ore., presented a paper on *"Use of High Alumina Brick in the Single Slag Basic Practice."*

In *"Operational Experience with a New Type Control,"* Joseph Seymour, Kensington Steel Co., Chicago, described his company's experience with hydraulic electrode controls, discussing the original equipment, modifications, operations, and savings.

S. E. McGinty, Firegan Sales Co., Chicago, narrated a colored motion picture, *"Foundry Ladle Practice for Acid Steel,"* depicting ganister production. The movie was followed by papers from Wilfred Luvisi, Bonney-Floyd Co., Columbus, Ohio, and from G. R. McDaniel and R. S. Haught, Sawbrook Steel Castings Co., Lockland, Ohio.

K. T. Apgar, Taylor-Warton Iron & Steel Co., Highbridge, N. J., and R. H. Lewis, Buffalo Foundry, Allegheny-Ludlum Steel Corp., Buffalo, N. Y., presented papers on foundry ladle practice for basic steel.

The conference closed with informal sessions dealing with ingots and castings, chairmen were, respectively, Gerhard Derge, Carnegie Institute of Technology, Pittsburgh, and T. V. Wainwright, Bethlehem Steel Co., Bethlehem, Pa.; and J. B. Caine, consultant, Cincinnati, and C. E. Sims, Battelle Memorial Institute, Columbus, Ohio.

Here's How Barber-Greene Co., Aurora, Ill., designed and manufactured complete equipment for handling any first aid emergency at any point within the 500,000 sq ft covered by the plant. Consisting of a compartmented, two-wheeled, pneumatic-tired push cart, easily manipulated by the plant's nurses, the unit contains everything needed for first aid work, from a stretcher to an automatic artificial respiration instrument. Other items carried by the mobile unit include a folding stretcher; special traction board for back and neck injuries; emergency lights; two blankets and a roll of padding; a CO_2 fire extinguisher; Timmins splints and a number of safety and first aid devices. Both the mobile unit and the traction board for back and neck injuries were designed by Allen W. Porter, safety engineer for the firm. Construction of the units were handled by the maintenance department at the plant. *Mine Safety Appliances Co.*

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Announce Three Early 1955 Regional Conferences

THREE AFS regional foundry conferences slated for early 1955 are: Wisconsin, February 10-11; Southeastern, February 17-18; and California, March 25-26.

Wisconsin Regional

The 18th Annual Wisconsin Regional Foundry Conference, sponsored by the Wisconsin Chapter and the University of Wisconsin Student Chapter of AFS in cooperation with the University of Wisconsin, will be held at the Hotel Schroeder, Milwaukee, February 10 and 11. Conference chairman is Paul C. Fuerst, Falk Corp., Milwaukee. Full conference tickets cost $12.00. Advance registration can be made with Bradley H. Booth, Carpenter Bros. Inc., 606 W. Wisconsin Ave., Milwaukee 3. Norman N. Amrhein, Federal Malleable Co., West Allis, has arranged a program of simultaneous sessions on foundry problems and equipment by management, pattern men, metallurgists, engineers, and foundrymen as follows:

THURSDAY, FEBRUARY 10

9:00 am . . REGISTRATION

10:00 am . . WELCOMING ADDRESS. Frank J. Dost, Sterling Foundry Co., Wellington, Ohio, AFS National President; and Dean Kurt F. Wendt, University of Wisconsin.

10:40 am . . GENERAL MEETING. *"Common Sense for a Common Good,"* Arthur A. Agostini, Grede Foundries, Inc., Milwaukee.

12:00 noon . . LUNCHEON. *"Impressions of European Foundry Practice,"* C. V. Nass, Beardsley & Piper Div., Pettibone-Mulliken Corp., Chicago.

2:15 pm . . SECTIONAL MEETINGS.

Malleable . . *"Casting Defects as Related to Sand Practice,"* Thomas E. Barlow, Eastern Clay Products Dept., International Minerals & Chemical Corp., Chicago.

Non-Ferrous . . *"Gas and Its Control in Aluminum Alloy Castings"* Donald L. LaVelle, Federated Metals Div., American Smelting & Refining Co., South Plainfield, N. J.

Gray Iron . . *"Significance of Physical Testing of Gray Iron,"* Prof. Philip C. Rosenthal, University of Wisconsin.

Steel . . *"Quality Control in the Melting Department,"* B. A. Lawson, Harrison Steel Castings Co., Attica, Ind.

Pattern . . *"Sealing Metal Core Boxes,"* Richard L. Olson, Dike-O-Seal, Inc., Chicago.

4:00 pm . . SECTIONAL MEETINGS.

Malleable . . *"Malleable Melting Controls,"* Lawrence E. Emery, Marion Malleable Iron Works . . Marion, Ind.

Non-Ferrous . . *"Melting and Fluxing of Non-Ferrous Alloys,"* David Stein, Samuel Greenfield Co., Inc., Buffalo, N. Y.

Gray Iron . . *"Core Sand Practice—Fact or Fiction,"* O. Jay Myers, Archer-Daniels-Midland Co., Minneapolis.

Steel . . *"Further Studies on the Problem of Metal Penetration,"* Dr. R. C. Emmons, University of Wisconsin.

Pattern . . *"Quality Control in a Pattern Shop,"* James M. Barrabee, International Harvester Co., Chicago.

6:30 pm . . BANQUET. *"Are Your Books Balanced?"* C. G. Arps, Allis-Chalmers Mfg. Co., West Allis.

FRIDAY, FEBRUARY 11

10:00 am . . SECTIONAL MEETINGS.

Malleable . . *"Annealing Problems Arising From Melting Irregularities,"* Prof. Richard W. Heine, University of Wisconsin.

Non-Ferrous . . *"Resins used in the Non-Ferrous Foundry,"* Dallas C. Amburn, Allied Chemical & Dye Corp., Pontiac, Mich.

Gray Iron . . *"Carbon as a Refractory,"* V. J. Nolan, National Carbon Co., Div. of Union Carbide & Carbon Corp., New York.

Steel . . *"Risering for Magnaflux Inspection,"* J. B. Caine, Consultant, Cincinnati.

Pattern . . *"Good Pattern Foundry Practices,"* A. F. Pfeiffer, Allis-Chalmers Mfg. Co., West Allis.

12:00 noon . . LUNCHEON. *"Baseball, a Fulfillment of our American Dream,"* H. E. Goodnough, Milwaukee Braves.

2:30 pm . . SECTIONAL MEETINGS.

Malleable . . *"Dielectric Core Ovens,"* W. H. Hickock, Thermex Div., Girdler Co., Louisville, Ky.

Non-Ferrous . . *"Information Forum,"* Messrs. LaVelle, Stein, and Amburn, and M. E. Nevins, Wisconsin Centrifugal Foundry, Inc., Waukesha, Wis.

Gray Iron . . *"A Review of Sand Bonding Processes,"* Frank S. Brewster, Harry W. Dietert Co., Detroit.

Steel . . *"Cleaning Room Practices,"* Panel Discussion: Stanley G. Lipinski, Pelton Steel Casting Co., Milwaukee; Stephen Kline, Crucible Steel Casting Co., Div. of Ebaloy Inc., Oconomowoc, Wis.; and Lloyd C. Olson, Bucyrus-Erie Co., Milwaukee.

Pattern . . *"Pattern Equipment for High Pressure Molding,"* Thomas E. Barlow.

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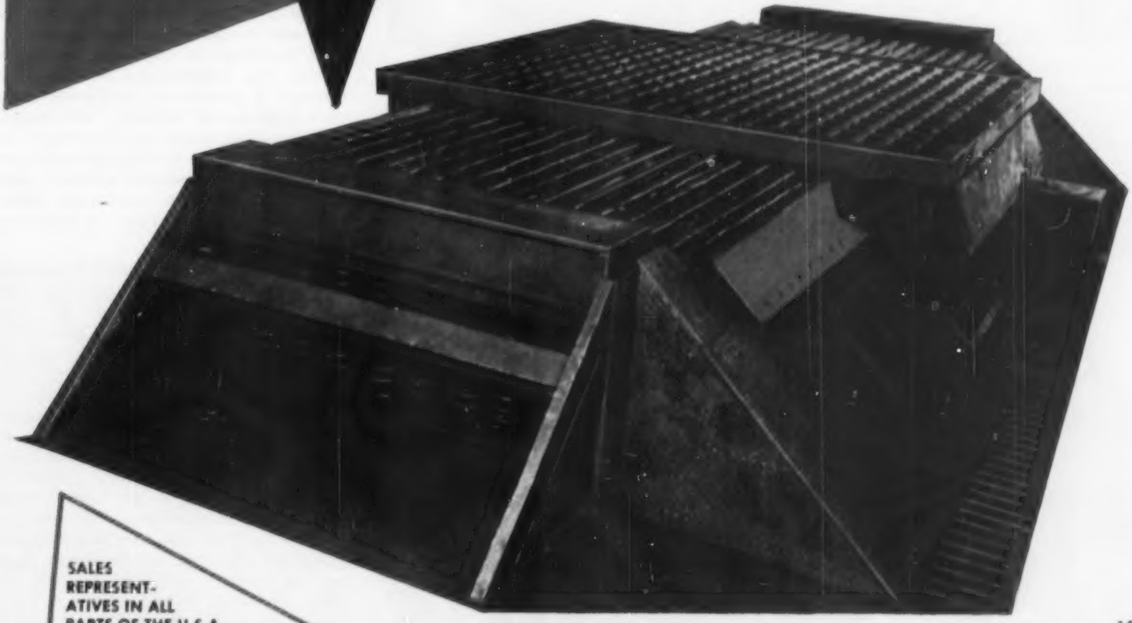
Investment Casting Institute Elects Officers

Newly elected Board of Directors of the Investment Casting Institute are left to right: A. C. Williams, Crucible Steel Co. of America; Ted Operhall, Misco Precision Casting Co. (newly elected president); Kenneth Thompson, Thompson Tool Co.; Vincent S. Lazzaro, Casting Engineers, Inc. (newly elected vice-president); Louis Brooks, Jelrus Precision Casting Co.; Ken J. Yonker, Misco Precision Casting Co.; and Kenneth M. Bartlett, Thompson Products, Inc. Harry P. Dolan, Harry Dolan & Associates, not shown in picture, was reappointed executive secretary.

Simplicity spring mounted shake-outs handle big flasks with ease at Beloit Foundry Company in Wisconsin

Installed at the Beloit Foundry Company, Beloit, Wisconsin, this Simplicity Shake-Out arrangement can handle big flasks ranging up to 75 tons regardless of the length or shape of the castings being shaken out. The center of the installation is a Simplicity 10′ x 12′ spring mounted shake-out which is one of the biggest single units in operation today. Prior to the installation of this shake-out, a Simplicity 8′ x 10′ Dual was used. By splitting the Dual and installing the new model between them, Beloit Foundry was able to get 200 sq. feet of useable shake-out surface. A combination of Positive Vertical Action with controlled throw, rugged body construction, and a massive 6′ Ductile Iron (nodular iron) deck which was cast by the Beloit Foundry Company, makes shake-out speedy and thorough without the danger of castings feeding off or bouncing off the deck. For handling heavy concentrated loads ranging up to 200 tons maximum, the Simplicity Spring Mounted Shake-Out is unequaled. If you're pouring really big castings it will pay you to call in your Simplicity sales engineer and let him give you all the facts on Simplicity Shake-Outs and other foundry equipment.



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Recently the Los Angeles Plant of U. S. Electrical Motors, Inc., conducted an Open House. Various methods used in the making of castings were given publicity as shown in above photo. Photo by Phil Mix, U. S. Electrical Motors, Inc.

The tenth addition to plant facilities by Austenal Laboratories at its Dover, N. J. Microcast location was the building and placing in full scale operation of an alloy making unit. Recently completed project, shown above, consists of a 10000 sf brick building furnished with the latest in alloy producing equipment including casting and shotting facilities. Occupying part of the main floor are modern, fully equipped high temperature testing and chemical laboratories.

Robert D. Dodge (left), Archer-Daniels-Midland Co., presents his company's annual contribution to the Foundry Education Foundation to John F. Smith, Chevrolet Gray Iron Div., G.M.C., chairman of the Industry Advisory Committee for Michigan State College. This brings A.D.M.'s investment in the Foundation to $16,000. H. Charles Esgar of F.E.F. is looking on.

News of Technical Committees

Recent Committee Meetings

Dust Control & Ventilation Committee, Chicago, Dec. 14

Joint Committee on Foundry Vocational Training, Education Div., AFS Technical Center, Des Plaines, Ill., Dec. 17

Castings Defects Handbook Revision Committee, Sand Div., Chicago, Jan. 17

Basic Concepts Committee, Sand Div., Chicago, Jan. 21

Research Committee 8-J, Sand Div., Ann Arbor and Detroit, Jan. 24-28

Dust Control & Ventilation Committee, AFS Technical Center, Des Plaines, Ill., Jan. 25

Program & Papers Committee, Gray Iron Div., Chicago, Jan. 28

Meeting Reports

Dust Control & Ventilation. Chairman John G. Liskow, American Air Filter Co., Inc., Louisville, called the meeting to order at the Drake Hotel, Chicago, on Dec. 14. The committee discussed plans for the Annual AFS Convention at Houston, May 23-27.

The committee revised the outline of ENGINEERING MANUAL FOR CONTROL OF IN-PLANT ENVIRONMENT OF FOUNDRIES. They reviewed sections of the book, accepting some for editing and printing and assigned other sections to authors. Sections will soon be available on fundamental elements of foundry ventilation, theory of exhaust hoods and system design, and ventilation systems applied to sand handling, as well as a section on testing and maintenance of ventilating systems. A section on sand preparation, core making, and molding, will include sand handling in the small foundry; another section is on melting operations for all furnaces, and several pouring operations; cleaning room, operations, inspection, and pattern making are treated in others.

Joint Committee on Vocational Training. The committee met Dec. 17 at the AFS Technical Center, Des Plaines, Ill., under the chairmanship of B. C. Yearley, National Malleable & Steel Castings Co., Cleveland. Besides Mr. Yearley, members of this new committee are: W. M. Caldwell, Gray Iron Founders' Society; G. K. Dreher, Steel Founders' Society; H. C. Esgar, Foundry Educational Foundation; W. J. Hebard, Continental Foundry & Machine Co., East Chicago, Ind.; C. L. Liebau, Federal Malleable Co., West Allis, Wis., (representing Malleable Founders' Society), W. H. Ruten, Polytechnic Institute of Brooklyn; A. B. Sinnett, American Foundrymen's Society; and J. W. Wolfe, Non-Ferrous Founders' Society.

The purpose of the committee project is "to provide written material of a limited technological nature that can be used by any shop in any way they desire." The manual to be developed is for an in-plant training course not intended for academic credit.

Foundry Tradenews

George & Dix, management consultants have changed their business address from the Michigan Trust Building to 228 Federal Square Building, 29 Pearl Street, N. W., Grand Rapids.

The first units of facilities for an expanded program of pilot-plant and large-scale research for American industry are nearing completion at **Battelle Memorial Institute's** recently purchased 400-acre site just outside Columbus, Ohio. They will be ready for installation of equipment in the next 30 days.

Wisconsin Stainless Foundry & Machine Corp., Waukesha, Wis., started operations in November 1954 in a 14,000 sq ft building. Much of the firm's production will be centrifugally cast stainless parts for jet aircraft. Officers of the new company are: M. E. Nevins, president; Warren Williams, vice-president and works manager; Paul J. Schneider, treasurer; and Joseph Antonow, secretary.

Kaiser Aluminum & Chemical Sales, Inc., announced the opening of a new branch sales office, Suite 480, Denver Club Building, 518 Seventeenth St., Denver. The Denver office formerly was located at 410 University Building, 910 Sixteenth St. Kaiser also announced the opening of another branch sales office in Gateway Center, Room 552, Building 2, East Wing, 140 Stanwix St., Pittsburgh. The office formerly was located at 2510 Grant Building, Grant St. and Fourth Ave., Pittsburgh.

Milward Alloys, Inc., Lockport, New York, has been appointed as a distributor of Reynolds aluminum pig and ingot by the Reynolds Metals Company.

W. J. Bullock, Inc., Fairfield, Ala., has been appointed as a distributor of the complete line of Kaiser Aluminum standard alloys ingot in Birmingham, Ala., and the southeastern states.

Williston & Co., Delta, Ohio are representing Minco Products Corp., Saginaw, nationally for the sale of their products, Minco Bond and Northern Bond.

Pennsylvania Crusher Co., a wholly-owned subsidiary of Bath Iron Works Corp. since 1947, has merged with the parent company and is now operated as the Pennsylvania Crusher Div. of Bath Iron Works Corp.

James H. Herron Co., Cleveland, has added an ultrasonic reflectoscope to the Non-Destructive Testing Section of its testing laboratories.

Earl E. Woodliff, foundry sand engineer, Detroit, has recently completed building an addition of 750 sq ft floor space to his present laboratory and office. New facilities are being added to expand and broaden the testing and research of foundry sands and binders.

Production of electrolytic manganese has been started by **Electro Metallurgical Co.,** Div. of Union Carbide and Carbon Corp. at its new plant at Marietta, Ohio. The plant will have a capacity of about 6,000 tons a year when all the electrolytic units are in full operation.

Metallurgical Consultants, Inc. have opened a new Metallurgical and Chemical Testing Laboratory at Center Line, Mich. They feature a 48-hour service on the majority of the chemical analyses of plain carbon and alloy steels, plain and alloyed cast irons, aluminum base alloys, copper base alloys, lead base alloys, and any other specialized alloys.

Eclipse-Pioneer Foundries, Div. of Bendix Aviation Corporation, has changed its name to Bendix Foundries. The change was made to emphasize the division's policy of serving the needs of a wide range of industrial customers in the aviation, electronic, and marine fields.

After a number of years with offices in five different buildings, **Union Carbide and Carbon Corp.** has consolidated its Cleveland offices in a new, modern office building and distributing center at 1300 Lakeside Ave.

The Carborundum Company has just completed two new warehouse and office buildings in California, and has reorganized sales, engineering and other services in the West into what is now designated the Pacific District, which includes the area west of the Rockies.

American MonoRail Co. announced the organization of the Canadian MonoRail Co., Ltd. as a wholly owned subsidiary at Galt, Ontario, and the purchase of the Landahl Conveyor Co., Columbus, Ohio to be maintained as a subsidiary and continue operations in its Columbus plant.

Central Foundry Division, General Motors Corp., Saginaw, has published a book entitled "ArmaSteel." It covers information in regard to the properties, advantages, fields of application and engineering data, as well as their manufacturing methods and controls.

Great North Foundry Ltd. is a wholly-owned subsidiary of Anthes-Imperial Co. Ltd. The company will be called Edmonton Branch of Anthes-Imperial Co. All correspondence concerning operations of Great North Foundry should be addressed Anthes-Imperial Co. Ltd., 9520 - 125th Ave., P. O. Box 698, Edmonton, Alberta.

Carborundum Co. has established a new operating unit, the Electro Minerals Div., to manufacture and sell silicon carbide and fused alumina crudes, abrasive grain and related electric furnace products in the U. S.

J. C. Corrigan Co., Inc., Boston, manufacturers of conveyors, have opened a sales office at 420 Lexington Ave., New York. Gilber Lavoie has been named as sales engineer in charge of this office.

McCrady Refractories, Inc. has been incorporated under Pennsylvania Law. The company's offices are in Harmville, and they have a mine and mill at Keister.

Poster Explains Advantages of AFS

Employees at Wells Manufacturing Co., Skokie, Ill., studying poster which points out the investment the company makes in its employees' progress by being a company member of the American Foundrymen's Society. Brochures in pocket of poster explain services of the Society and include an AFS application blank. Posters and supply of brochures are to be sent to all company and sustaining members of AFS.

Left is R. C. Wood, chairman of S.F.S.A. National Technical & Operating Committee, presiding at the 9th Annual Conference. Right shows H. G. Robertson, American Steel Foundries, left, and F. Kermit Donaldson, executive vice-president, S.F.S.A., chatting at one of the sessions.

Steel Founders' Hold T & O Conference

CONSTRUCTION of Molding Sands for Steel Castings, proved to be the outstanding topic at the Ninth Annual Technical & Operating Conference of the Steel Founders' Society of America held in Cleveland, November 3-4 and 5, 1954. R. C. Wood, Minneapolis Electric Steel Castings Co., presided at the conference as Chairman of the National Technical & Operating Committee of the Society.

The session on molding sands featured the simplification of molding practice and improvement of casting finish through closer sand control. Sand mixture fundamentals for large castings were also covered and considerable data relating to the use of dry and wet reclaimed sand in both core and molding mixes completed the presentation. F. P. Murschel, Farrell-Cheek Steel Co., was chairman of the session, and he was assisted by J. H. Janssen, Pratt & Letchworth.

"Steel Molding Processes" reported progress within the industry on both the shell as well as ceramic molds for low carbon steel castings. Presiding over the meeting was C. F. Hartel, Falk Corp., who was assisted by A. J. Kiesler, General Electric Research Laboratory.

A four-part session on Heat Treating in the Steel Foundry revealed new techniques which developed more accurate results and better properties in low carbon steel castings. Heat treating cycles, continuous heat treat and improved variations of standard heat treating practices resulting in several quality and strength improvements were established as commercially sound practice with modified heat treating equipment. I. W. Sharp, American Steel Foundries, presided and was assisted by A. Finlayson, Pacific Car and Foundry Co.

Robert Bedford, American Cast Iron Pipe Co., and B. G. Emmett, Los Angeles Steel Casting Co., presided over the session on Noise, Smoke and Dust Control. Discussion included disposal of waste from wet sand reclamation system, smog control in the foundry, the general topic of noise elimination in foundry operations, and a dramatic presentation of the possibilities existing in the reduction of noise through the elimination of chipping hammers.

For the first time in the T & O Conference series, a full session was devoted to Gimmicks, Gadgets and Processes. This session was presided over by Frank B. Barclay, Jr., General Steel Castings Corp., with A. J. Kiesler, General Electric Research Laboratory, as assistant chairman. Among items covered were devices to prevent chute wear, charging of electric furnaces with fork lift trucks, zircon ladle practice, core rod and chisel remover, discussion of ramoff preventing devices, the use of offset trunnions, use of a sandblast device for cleaning clogged vents in core boxes, and a method for checking clay buildup on sand grains by means of screen analysis. Thirty-three separate items were covered varying from practical gimmicks functioning as time savers in production to several items in the quality control field.

The Conference was attended by 478 men from the technical and operating staffs of member companies. Plans for the tenth annual conference scheduled for the fall of 1955 were immediately launched upon the close of the 1954 Conference.

Committee for the S.F.S.A., 9th Technical & Operating Conference, back row, left to right: F. B. Barclay, Jr., General Steel Castings Corp.; I. W. Sharp, American Steel Foundries; B. G. Emmett, Los Angeles Steel Casting Co.; C. F. Hartel, Falk Corp.; R. Bedford, American Cast Iron Pipe Co.; and F. P. Murschel, Farrell-Cheek Steel Co. Front row, left to right: A. J. Kiesler, General Electric Research Laboratory; R. C. Wood, Minneapolis Electric Steel Castings Co.; C. W. Briggs, S.F.S.A., and R. L. Gilmore, Superior Steel & Malleable Castings Co.

DOW CHEMICAL CO.

SAGINAW VALLEY . . Past presidents after being presented certificates at the "Tenth Anniversary Meeting," from left to right: K. Priestley, J. J. McDonald, C. Morrison, O. Sunstedt, R. Klawuhn, J. H. Smith, M. V. Chamberlain, and A. Edwards.

Chapter News

Saginaw Valley Chapter Celebrates 10th Anniversary

Saginaw Valley Chapter honored its past chairmen at a "Tenth Anniversary Meeting" held recently in Frankenmuth, Mich. C. B. Schneible, AFS National Director, presented certificates to past chairmen: C. Morrison, J. H. Smith, M. V. Chamberlin, O. Sunstedt, R. Klawuhn, A. Edwards, K. Priestley and F. J. McDonald. Past chairmen unable to attend the meeting were H. McMurry and L. Clark.

Mr. Sunstedt gave a short talk on the formation of the chapter, emphasizing the support received from the Detroit Chapter. Mr. Morrison, first chairman of the chapter, reported his experiences as a foundry consultant in Europe since 1951. All phases of the foundry industry were covered, from raw materials to finished castings.

Over 170 members and guests were present at the December meeting of the Saginaw Valley Chapter at Frankenmuth, Mich. Present were members of the Chesapeake, Toledo, Saskatchewan and Michigan State College chapters.

Harry H. Kessler, Sorbo-Mat Process Engineers, St. Louis, guest speaker, talked on *"Factors Affecting the Quality of Castings."* In order to make clean, solid castings, he emphasized the necessity for control of all raw materials used in blending the various base mixes; consistent quality of metal being poured into the mold; metal poured at proper temperature into a mold that has been properly designed from the standpoint of gates, runners and risers. To get consistent quality of iron from a cupola, the velocity of air from the tuyeres along with the quantity must be measured and regulated. Kessler stated that centerling shrinkage in nodular irons can be minimized by the addition of rare earth fluorides together with magnesium and/or cerium inoculants. Sulfur can be reduced by treatment of the iron in the ladle with calcium carbide. Combined carbon in irons can be controlled by a knowledge of the materials charged in the cupola and by the use of the wedge and chill wafers to measure depth of chill and the proper interpretation of the chills. Gating and risering principles are also discussed. Following the technical presentation, Mr. Kessler spoke "off-the-record" about the current boxing situation and boxers both past and present.—*Nicholas Sheptak.*

Central Illinois

A Christmas party was held December 11 by the Central Illinois Chapter attended by 460 persons, consisting of foundrymen, their wives and guests. Flowers were presented to the ladies. After dinner a drawing was conducted for door prizes. This was followed by a vaudeville show and then dancing.—*C. Turner.*

Ohio State

The December meeting of the Ohio State Student Chapter was held in the Industrial Engineering building of the Ohio State University. Members were honored to have as their guests, Dallas Marsh, Cooper Bessemer Corp., Mt. Vernon, Ohio, industrial advisor; and George Schippereit, Battelle Memorial Institute, Columbus, Ohio, principal speaker. *"The Winning and Forming of Titanium Products,"* was the subject of Mr. Schippereit's

JOHN BING, METROPOLITAN REFRACTORIES CORP.

METROPOLITAN . . Groups attending the chapter's Christmas Party at the Essex House, December 10.

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Each of these bags contains 25 lbs. of vanadium for handy cost-saving additions to furnace, cupola or ladle.

SAVES TIME AND MONEY—You don't have to weigh prior to alloy addition. Each bag contains exactly 25 lbs. of vanadium. Thus you save on handling costs.

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FRED RIDENOUR, WHITING CORP.

CHICAGO . . Past presidents, and members of the Past Presidents Club, attending the January meeting, are left to right: J. Thomson, 1935-36; L. J. Wise, 1936-37; H. W. Johnson, 1937-38; L. J. Rudesill, 1938-39; G. P. Phillips, 1940-41; A. G. Gierach, 1942-43; C. K. Faunt, 1948-49; W. D. McMillan, 1949-50; C. V. Nass, 1950-51; W. W. Moore, 1951-52; J. Owen, 1952-53, and J. A. Rassenfoss, 1953-54.

talk. His remarks were largely based upon experimental work in which he has been engaged at Battelle.

On November 11 a group of 20 engineering students from Ohio State University visited the foundry and engine plant of the Ford Motor Co. in Cleveland. The group was under the guidance of Dr. D. C. Williams. Transportation was provided by the Central Ohio Chapter.—*W. Fred Clutton.*

Chicago

President Bob Doleman turned the January meeting of the Chicago Chapter over to James Thomson, president of the newly formed Past Presidents Club, who introduced past presidents of the Chicago Chapter (guests of the evening), and traced the development of the Chicago Chapter from 1903 beginnings through the inauguration of AFS local chapters with the Chicago Chapter being first.

W. G. Ferrell, Auto Specialties Mfg. Co., St. Joseph, Mich., guest speaker, spoke on *"Properly Engineered Castings Will Save Your Customers Money."* He told how his company has taken hundreds of jobs away from forgings with castings which were better as well as cheaper. Hundreds of parts forged today could be cast better and cheaper; but the foundryman must know the application of the part, help the engineer to design for casting, cast the part, have it machined, and tested in application (at no cost to the customer, if necessary) to get the jobs. Controlled quality and quicker and surer delivery are added reasons to make it a casting.

Tri-State

The Tri-State Chapter held its fourth annual Christmas party at the Crystal Ball Room of the Mayo Hotel, Tulsa, Okla. Approximately 150 members and guests attended. Following dinner some 25 prizes were awarded. First prize, a $100.00 War Bond, was won by John Timberlake, Leland Equipment Co., Tulsa. Fifty dollar War Bonds were won by M. N. DeWitt and Glenn Bowman, both of Oklahoma Steel Castings, Tulsa. —*Albert M. Fisher.*

St. Louis

Over 150 members and guests attended the December meeting of the St. Louis Chapter. A Christmas touch was added to the technical meeting by the awarding of attendance prizes.

Webb L. Kammerer, Midvale Mining and Mfg. Co., conference chairman, announced that the Missouri Valley Regional Conference will be held October 20 and 21, 1955 at Missouri School of Mines, Rolla, Mo.

Technical chairman Henry Meyer, General Steel Castings Corp., introduced the guest speaker J. S. Schumacher, Hill and Griffith Co., who spoke on "Fool Proof Sand." The Speaker listed the following properties as being typical of a fool proof sand for gray iron; 3.5 per cent water; 70 to 90 green permeability; 7 to 9 psi green compressive strength, and 80 mold hardness. By means of charts it was shown that only with a 4 screen sand does the permeability level off with increased ramming. —*Jack Bodine.*

Northern California

The Northern California Chapter held a "Foundry Round Table" at its December meeting at the Hotel Shattuck, Berkeley, Cal. This was the first Round Table sponsored by the chapter. Each speaker was alloted five minutes on his subject with a question and answer period following the talks. Approximately 107 members and guests were present.

Speakers and their subjects were: Don Mason, Superior Electrocast Co., *"The Co_2 Process"*; Nino Davi, Pacific Steel Castings Co., *"Use of Dyes in Core and Molding Sands"*; James Campbell, University of California, *"Rapid Moisture and Density Determination, by Radiation Methods, of Molding Sands"*; Michael Furey, Mare Island Navy Yard, *"Bearing Metals"*; Don Caudron, Pacific Brass Foundry, *"pH Factor"*; E. Ritelli, General Foundry Service Corp., *"Flasks"*; Angelo Castagnola, ABC Pattern Works, *"Patterns"*; Maurice Sands, Div. of Apprenticeship, State of California, *"Apprenticeship"*; Harold Wegner, Pacific Foundry Co., *"Alloyed Castings"*; Robert Fisher, Vulcan Foundry Co., *"Control of Basic Slag"*; James Francis, Micro Metals, *"The Shell Molding Game"*; Harold Hirsch, Amsco Div., American Brake Shoe Co., *"Safety"*, and Harold Henderson, H. C. Macaulay Foundry Co., Program Moderator. Clayton Russell, Phoenix Iron Works, was Program Chairman and John Bermingham, E. F. Houghton Co., chapter chairman presided.—*J. M. Snyder.*

Ontario

The Ontario Chapter has published a 1954-1955 membership roster. Booklet also includes the Chapter By-Laws and meetings, dates and places. Officers and committees as well as a listing of Ontario Chapter past chairmen are included. A directory of firms is also a part of the book.

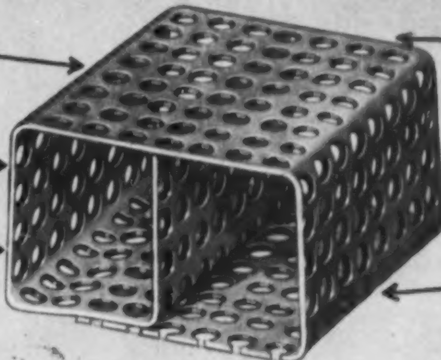
Rochester

"New Developments in Foundry Welding" was the topic of interest at the December meeting of the Rochester Chapter. L. D. Richardson, Eutectic Welding Alloys Corp., Detroit, told and showed how money could be saved by reclaiming castings with defects; also how foundry machinery could be maintained and kept running by using welding for repairs. Consideration must be given to the fact—is the part worth repairing. Should the weldment cost more than a new part, it would be desirable not

ST. LOUIS . . Part of the capacity crowd that attended the December meeting to hear J. S. Schumacher speak on "Fool Proof Sand."

the perfect COMBINATION → of SHAPE and SIZE → for LIGHT CORE castings

fine FANNER perforated chaplets



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Large number of perforations in light metal insure perfect fusion in light castings.

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Widely distributed support area holds core more securely in place.

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Produced to exacting standards on specially designed machines to meet specifications.

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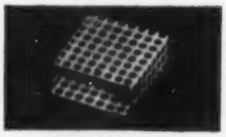
There are no gas or air pockets to cause "blow holes", so that perfect ventilation is secured.



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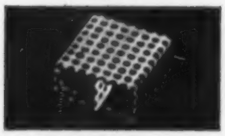

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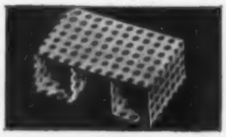

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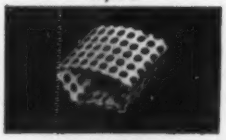

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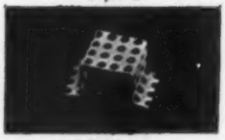

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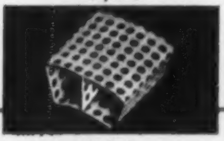

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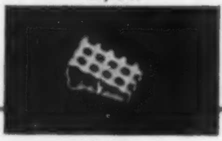

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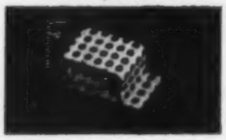

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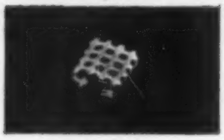

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WESTERN MICHIGAN . . Attending the December meeting are, left to right: George Bartlett, Neway Equipment Co., chapter vice-chairman; E. T. Price, Cadillac Malleable Iron Co., technical chairman; Hyman Bornstein, John Deere & Co., retired, principal speaker; George W. Cannon, G. W. Cannon Co.; and John A. VanHaver, Sealed Power Corp., chapter chairman.

TRI-STATE . . Some of the foundrymen's wives admiring the prizes awarded at the fourth annual Christmas party held at the Crystal Ball Room of the Mayo Hotel, Tulsa, Okla. Twenty-five prizes were awarded, including a $100 War Bond, which was won by John Timberlake, Leland Equipment Co., Tulsa. Approximately 150 members and guests attended.

CENTRAL ILLINOIS . . Mrs. Sam Gartland, right, receiving one of the prizes at the Christmas party. Watching left to right are Mrs. John Nieman and Mr. Gartland. Approximately 460 persons consisting of foundrymen, their wives and guests, attended.

to repair it, but to procure a new part. Often time to obtain a new part may be so long that it is desirable to repair a broken part, he said. Foundrymen should not feel ashamed of welding a casting of value. Costs are important and the saving of castings through the use of welding, will aid the foundrymen as well as the user of the casting. With new electrodes of the steel type, nickel iron type, or higher nickel coated type, the gray iron foundryman can give his customer good sound castings, reduce his losses and keep up his schedules for delivery, he concluded.—*Herbert G. Stellwagen.*

Detroit

V. H. Patterson, Climax Molybdenum Co., and Grant Whitehead, Claude B. Schneible Co., participated as Counselors, representing the American Foundrymen's Society, at the 20th Annual Vocational Guidance Meeting held by the Engineering Society of Detroit. The purpose of the meeting was to aid Detroit area high school students in their selection of engineering as a profession.

Counselors taking part in the meeting are selected by the local officers of various engineering and technical societies at the request of the Engineering Society of Detroit. The men gave their time and experience freely as a public service to advance their professions by attracting young men naturally fitted for such work.

Northwestern Pennsylvania

Northwestern Pennsylvania Chapter has a working committee entitled Foundry Advisory Committee. Earl Strick, Erie Malleable Iron Co., is chairman. Other members are: John Clark, General Electric Co., Charles Gottschalk, Cascade Foundry Co., and Robert L. Johnson, Bucyrus-Erie Co.

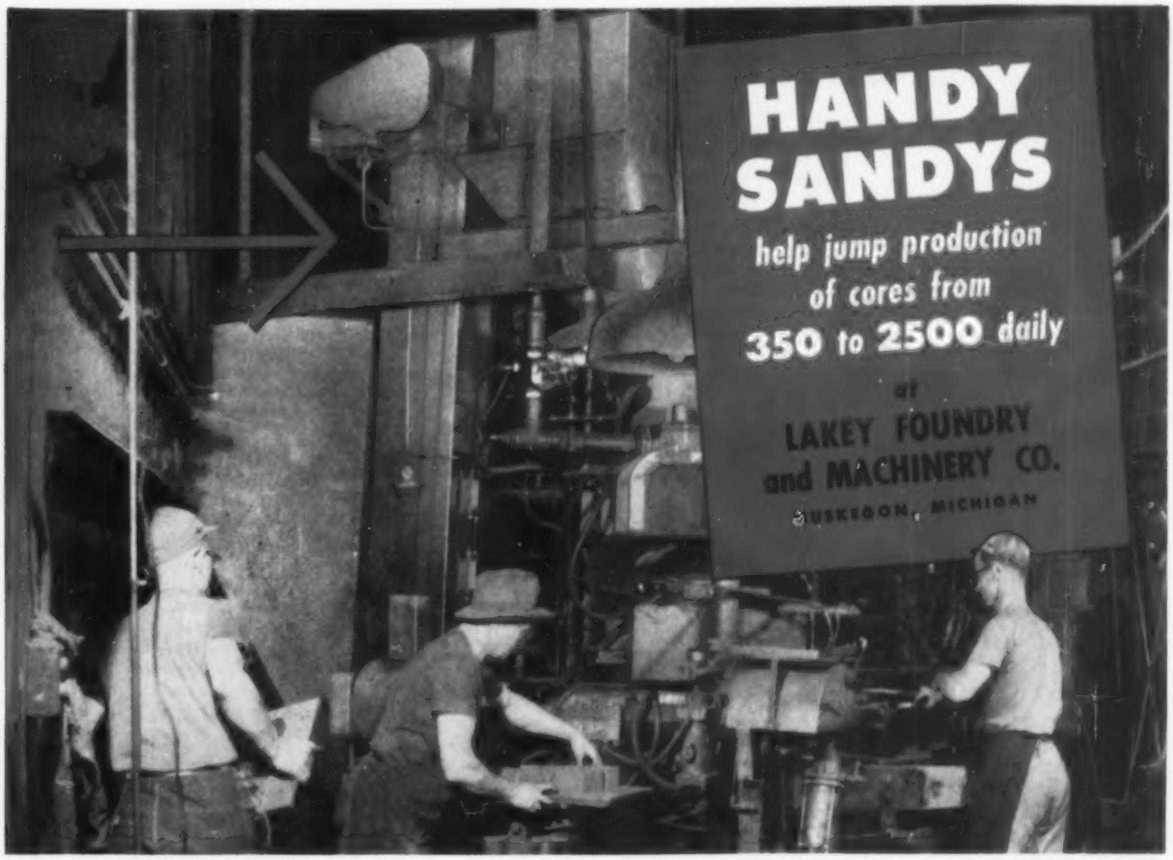
This committee has promoted an outstanding cooperative program with industry and business which enables hundreds of business men and women to inspect the local schools. They have also continuously assisted the school people in the running and development of the foundry program in the Erie Technical High School. Considerable work is done by the committee in connection with Business-Industry-Education Day which is staged in many localities throughout the United States.

Twin City

Fifty college and high school students, together with their instructors and representatives of various education and apprenticeship groups in the Twin City area, were guests of the Twin City Chapter at the November meeting. This was the annual meeting designed around the educational theme and intending to provide students and potential foundrymen with an opportunity to meet the men in the industry and learn something of the progress being made in the technical end of the business.

D. B. Fulton, Northern Malleable Iron Co., St. Paul, Minn., headed the Educational Committee which made arrangements for the meeting.

T. C. Anderson and E. J. Egghazi, pat-



"GOOD CORES HELP MAKE GOOD CASTINGS"

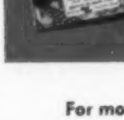
The Lakey Foundry and Machine Company had the problem of how to turn out better cores in greater numbers, faster and at less cost. The cores had been made by hand ramming, with one man making up to 350 cores per 8-hour day.

A Newaygo Handy Sandy was installed in conjunction with a Rotary Core Blower, and with three men working on the unit, production was stepped up to well over 300 cores per hour, or at least 2,500 cores per 8-hour day.

A second Handy Sandy was then installed to operate with a large Core Blowing Machine and a Core Rollover, which when in full production blows cores at 100 cores per hour with one man as compared with the hand method of 45 per hour per man. The cores average from 14 to 50 lbs. each.

While we have only recently introduced Handy Sandy units for use with blowing machines, acceptance has already been proved by the fact that such outstanding foundries as General Electric Company, Schenectady, New York; Mueller Company, Chattanooga, Tennessee; James B. Clow, Coshocton, Ohio; Goulds Pumps, Inc., Seneca Falls, New York; Lakey Foundry and Machine Company, Muskegon, Michigan and other prominent foundries have purchased either the standard or Super Handy Sandy units designed especially for their existing core blowing machines.

The primary purpose of the Handy Sandys in these installations is to provide core sand for high production core blowing at low cost. The units are practically maintenance free, and being full automatic, eliminate hand ramming and shoveling of any type. Standard Handy Sandy units will supply core machines with up to 6 tons of sand per hour, while the Super Handy Sandys are now available with a maximum of 30 tons per hour.



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ternmaker apprentices from Northern Malleable Iron Co., and American Hoist & Derrick Co., respectively, were introduced to the group as having received a citation for outstanding achievement in the national Ford Industrial Arts Contest. George T. Boli, Northern Malleable Iron Co., spoke on *"The Foundry Needs Engineers"* at the regular business meeting. He pointed out that the foundry industry needs engineer type thinking throughout the many phases of its work rather than any specific skills. In particular, Mr. Boli stressed the importance of engineers in the sales department. Sales engineers are needed to perform the vital service that customers require today. He must also be able to recognize potential applications for castings where forgings and weldments are now being used, Mr. Boly said. Engineering thinking is required for technical advancement of the industry.—*R. J. Mulligan.*

Southern California

Approximately 350 members and guests attended the Annual Christmas Party given by the Southern California Chapter at the Lakewood Country Club, Long Beach, Cal., December 14. A group of prizes were awarded and entertainment followed the dinner. Ray Orr was chairman of the entertainment committee. The committee conducting the apprentice contest for the chapter have received from the National Office the patterns for the molding contest and the pattern making contest. The contest is open to apprentices and students of trade schools. Emil Peschke, Reliance Regulator Div., American Meter Co., is chairman of the Apprentice Molders Committee and Jim Oliva, Pattern Supply Co., is chairman of the Apprentice Pattern Makers Committee.— *W. G. Stenberg.*

GENERAL MOTORS PHOTOGRAPHIC SECTION

DETROIT . . Talking shop during the November meeting of the chapter held at the Pontiac Motor Foundry, Pontiac, Mich. Left to right: Jess Toth, Harry W. Dietert Co., Detroit; George Collingwood, Pontiac Motor Div., and Clifford Hockman, Cadillac Motor Car Div.

NORTHERN CALIFORNIA . . Head table at the December meeting, from left to right; front row: John Bermingham, Don Mason, Nino Davi, James Campbell, Michael Furey, Don Caudron, David Sutch, E. Ritelli and Angelo Castagnola. Back Row, left to right: Maurice Sands, Harold Wegner, Robert Fisher, James Francis, Harold Hirsch, Harold Henderson and Clayton Russell.

E. H. MOSSNER

SAGINAW VALLEY . . Head table at the December meeting are left to right: C. Thomas, Chairman, M.S.C. Student Chapter; Prof. C. C. Sigerfoos, Michigan State College; H. H. Kessler, Serbo-Mat Process Engineer, technical speaker; W. Holden, Foundry Div., Eaton Mfg. Co., chapter chairman; R. Foster, Bay City Foundry, technical chairman; F. P. Strieter, Dow Chemical Co., chapter vice-chairman, and G. Stuary, Bostick Foundry, chapter director.

HOWARD BODWELL, GENERAL ELECTRIC CO.

EASTERN NEW YORK . . Group enjoying the buffet dinner at the Christmas Party held December 14 at Panetta's Restaurant, Menandes, N. Y.

Eastern New York

Approximately 200 members and guests attended the seventh annual Christmas Party of the Eastern New York Chapter at Panetta's Restaurant, Menandes, N. Y., on December 14. The committee, which included R. N. Williams, chairman, J. Wheeler, F. Rothery, R. MacArthur, S. Eliot and E. Fram, made arrangements for a buffet supper and entertainment. In addition a large number of door prizes were distributed.—*L. J. DiNuzzo.*

Birmingham District

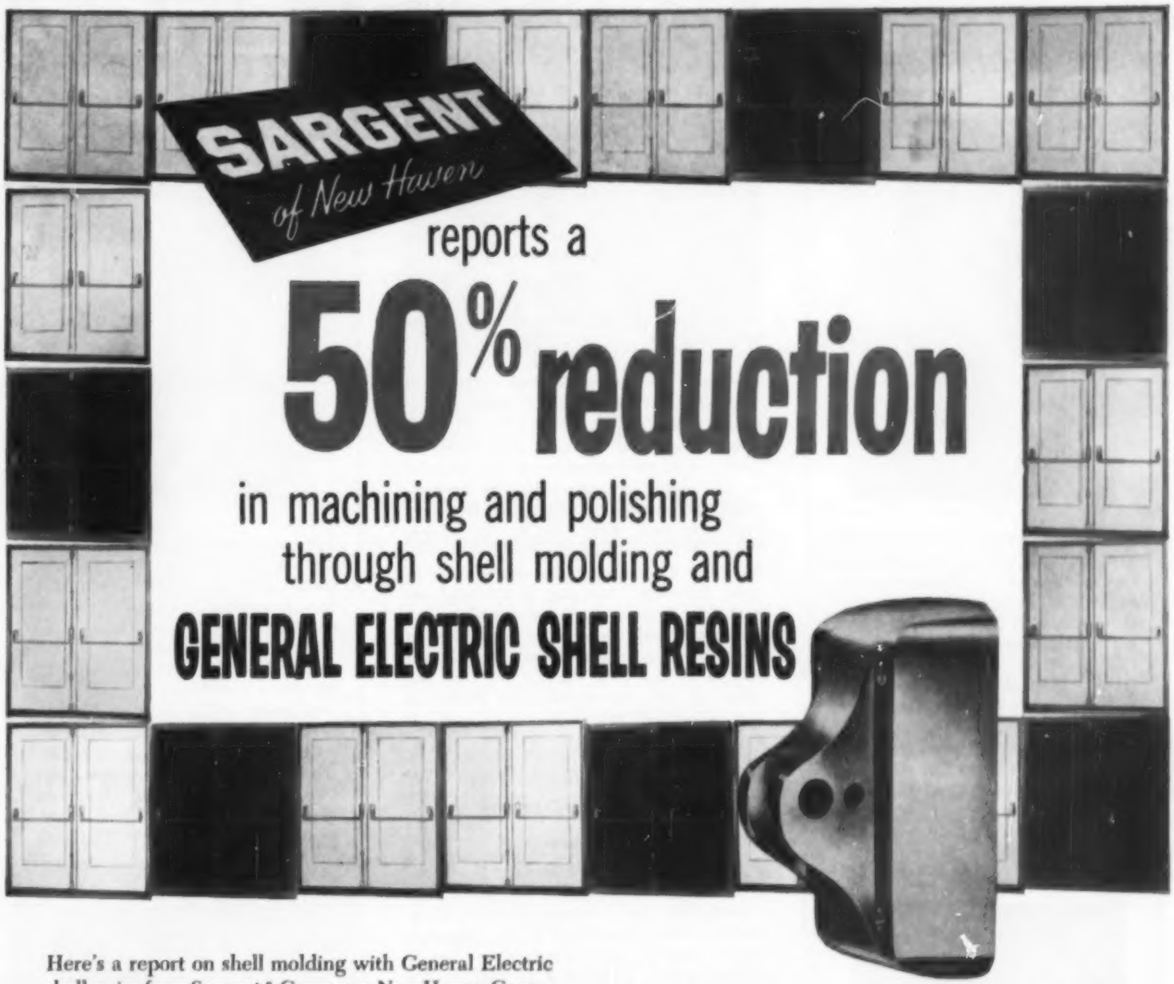
The first mixed meeting of the Birmingham District Chapter saw 60 members and their ladies gather in the Terrace Ball Room of the Tutwiler Hotel on December 10. Messrs. Edwin E. Pollard and Albert J. Fructchl, chairman and vice-chairman of the chapter extended a welcome to the ladies. Joe Travis, American Cast Iron Pipe Co., acted as toastmaster. Speaker of the evening was Leck N. Shannon, Stockham Valves and Fittings, Inc. He discussed, mainly for the benefit of the ladies, the aims of the American Foundrymen's Society.— *J. A. Wickett.*

Central Indiana

At the December 6 meeting of the Central Indiana Chapter, the resignation of one director and appointment of a new director was announced. The director who resigned is Fred Schwier of Federal Foundry Co., which plant is now closing. O. L. Wilhelm, Delco Remy Div., G.M.C., Anderson, Ind., was appointed by the chapter board to replace Mr. Schwier.

Michiana

The Michiana Chapter held its December meeting at the Oliver Hotel, South Bend, Ind., with 130 members and guests pres-



Here's a report on shell molding with General Electric shell resins from Sargent & Company, New Haven, Conn.:

"Shell molding with G-E shell resins has proved ideal for producing parts for our new line of 'Quick' Exit Devices. The shell process permits the use of hard, high-grade bronze—resulting in a completed product unsurpassed in finish and texture."

Machining, polishing operations cut in half! "Parts are *sounder*—have more uniform grain structure. They're *smoother*—free from surface gas holes. *Machining and polishing operations were reduced by 50%*. Over-all result: a product better in both strength and appearance, produced more quickly and easily, with faster deliveries so important to sales."

Sargent uses three General Electric shell-molding products to turn out "Quick" Exit Device parts: **G-E 12374 phenolic shell-molding resin** to form light, dimensionally accurate molds, **G-E SM-55 silicone parting agent** to secure quick, easy release of molds from patterns, and **G-E 12316 bonding resin** to cement shell halves together.

FREE BOOKLET AVAILABLE

How can shell molding help YOU? General Electric, a major supplier of molding and release agents for the shell process, has prepared an informative 28-page manual telling about the techniques and benefits of this new foundry method. *Just mail the coupon for a free copy!*

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GENERAL ELECTRIC

AFS Chapter Chairmen

Edward W. Wey, vice-president, Dee Brass Foundry, Inc., Houston, is chairman of the Texas Chapter of AFS. While attending the American School in Houston, he served his apprenticeship at Southern Pacific Railroad, where he remained until 1938, when he became a salesman with Dee Brass Foundry. Mr. Wey has also served as vice-chairman and program chairman of the Texas Chapter of AFS and is the vice-chairman of the General Convention Committee for the 1955 American Foundrymen's Society Convention.

James N. Wessel, chairman of the Washington Chapter of AFS, is supervisory production metallurgist and assistant to the chief of laboratories, Puget Sound Naval Shipyard, Bremerton, Wash. After graduation from Michigan College of Mining and Technology, he was employed by Ingersoll Steel and Disc Div., Borg-Warner Corp. until March 1934 when he joined Campbell, Wyant and Cannon Foundry Co., Muskegon, as an electric melter. In 1939 he joined Mare Island Naval Shipyard and in 1940 was transferred to Puget Sound.

ent. National Directors present were E. C. Hoenicke, Eaton Manufacturing Co., Detroit; and Martin Lefler, Oliver Corp., South Bend.

A short board meeting attended by the National Directors, preceeded the regular meeting. Mr. Hoenicke spoke on *"The National Office,"* its scope, the staff reorganization, research and continued growth of the society. Mr. Lefler pointed out that the society was a technical society and its prime objective was the educational and scientific advancement of the metal casting industry. A moment of silence was observed by the group in respect for John McAntee a member who died recently.

Max W. Koenigshof, Clark Equipment Co., was presented to the group and awarded the second place certificate in apprentice steel molding.

Joe Banach and Russ Manley were introduced as new directors of the chapter to fill vacancies caused by the resignations of messers Huffman and Bopes.

Vice-chairman Fred Davis introduces L. D. Pridmore, International Molding Machine Co., who spoke on *"Tricks In Core Blowing."* Venting is the real secret, Mr. Pridmore pointed out. Size and number of vents and blow holes depend upon the type of sand and the general contour of the core. Care of the core box after use was also stressed. Mr. Pridmore illustrated his talk with slides.—*F. J. Crowley.*

Other Organizations

Connecticut Non-Ferrous

The Connecticut Non-Ferrous Foundrymen's Association held its December meeting at the Quinnipiac Club, New Haven, Conn. President S. W. Chappell led a question and round table period. Proper gluing or pasting of shell molds in order to avoid "finning" was discussed. A member desired to know the temperature at which to heat 85-5-5-5 castings to obtain softness in the alloy. The question was raised about sprue disintergration when pouring 85-5-5-5 horizontally. It was suggested making longer investments under the shell on the pattern so as to result in a heavier and stronger shell.

At the November meeting F. S. Brewster, Harry W. Dietert Co., Detroit, gave the concluding part of his lecture, *"How to Get More Production Through Sand Control."*

The time is at hand for all foundries to put a definite sand program into action, he said. A man called a sand engineer or with some equivalent title is needed. This job will be the management of molding materials instead of simply testing them. While some feel it is desirable to have a graduate engineer tackle such a job, there are other requirements that are important. This man has to have an inquisitive mind and while studying what has to be done, never hesitate to question how good it is. Since sand control is best based on physical properties, we should have an idea of what are the important tests for control as distinguished from research, he pointed out.—*Frank B. Diana.*

AFS Chapter Chairmen

John Bermingham, special foundry service engineer for the western division of E. F. Houghton Co., San Francisco, is chairman of the Northern California Chapter of AFS. After graduation from California School of Mechanical Arts, he was a machinist apprentice for two years and a foundrywork apprentice for two years. Mr. Bermingham was employed as a purchasing agent, sales manager, and foreman before joining Houghton 19 years ago. He is a past chairman and past secretary of American Society for Metals.

William H. Oliver, chairman of the Western New York Chapter of AFS, is general superintendent of the Bond Plant, American Radiator & Standard Sanitary Corp., Buffalo. He has been employed by the company since 1938, when he joined the engineering department, Louisville Works. After serving six years with Army Engineers, Mr. Oliver returned to the Louisville Works as assistant to the superintendent of the enameled iron department. Mr. Oliver has been vice-chairman and a director of the Western New York Chapter.

FRED RIDENOUR, WHITING CORP.

CHICAGO . . W. G. Ferrell, Auto Specialties Mfg. Co., addressing the January meeting on the subject of "Properly Engineered Castings Will Save Your Customers Money."

Chapter Meetings

February

2 . . Toledo

Toledo Yacht Club. Victor Zang, vice-president, Unitcast Corp., Toledo, "International Convention in Paris."

3 . . Canton

Elks Club, Barberton, Ohio. Hans Heine, AFS technical director, *"Effects of Design on Castings Quality."*

4 . . Corn Belt

Jim Robinson, Bendix Aviation Corp., *"Non-Ferrous Problems."*

7 . . Metropolitan

Essex House Hotel, Newark, N. J. Ned Roudabush, ceramic engineer, General Refractories Co., *"Foundry Refractories."*

7 . . Central Indiana

Athenaeum, Indianapolis. Gerry Grott, Unitcast Corp., *"pH and its Relation to Sand Control."*

7 . . Central Illinois

American Legion Hall, Peoria. Tom E. Barlow, Eastern Clay Products, *"High Pressure Molding."*

7 . . Western Michigan

Bill Stern's, Muskegon. Frank Rote, Albion Malleable Iron Co., *"Stack Molding."*

7 . . Chicago

Chicago Bar Association, Chicago. National Director Night. Gray Iron & Malleable Div.: John Van Haver, Sealed Power Corp., *"Necessary Controls for Light Section Quality Castings."* Steel Div.: Frank Satek, Continental Fdry. & Mach. Co., *"Casting Improvement by Modern Inspection."* Non-Ferrous & Pattern Div.: Harry St. John, Crane Co., *"Melting of Brass and Bronze."* Maintenance Div.: W. Wroblewski Crane Co., *"Operation and Maintenance of Pneumatic Sand Handling Equipment."*

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Quiz Answers

continued from page 64

Here are the answers to the questions about crucible care on page 64.

1. (a) & (b) Tap the crucible with a hammer handle; a dull sound indicates cracks, a resonant ring indicates crucible is intact.

2. (a) Because crucibles have a tendency to absorb moisture, temperatures of ideal storage should be 170-210 F.

3. (a) Bring clay-bonded graphite crucibles to temperature slowly.

4. (a) & (c) Bring carbon-bonded silicon carbide crucibles to temperature quickly; some manufacturers have individual recommendations. Many foundrymen consider it a good practice to preheat the furnaces to insure quick elevation of crucible temperature.

5. (b) & (c) High metal levels in the crucible are desirable because the crucible wall, when half filled, is hotter above the metal causing internal thermal stresses that shorten crucible life and may produce cracking.

6. (b) Expansion of a tightly packed charge is apt to crack the crucible.

7. (b) Preheating cleaned scrap by placing it around the furnace cover hole utilizes heat otherwise wasted and saves fuel and time in melting.

8. (b) The crucible should be removed from the furnace as soon as the pouring temperature has been reached.

9. (b) To insure the filling of thin sections of light castings the metal should be hotter than for larger castings.

10. (c) Crucibles should be cleaned after each heat while hot to prevent oxide build-up.

11. (b) & (c) The insulating oxide layer expands at a different rate than the crucible causing internal stresses which often crack the crucible.

12. (b) It is possible to flux at any time during melting as long as there is a pool of metal; however, a minimum of flux added just before pouring is least harmful to the crucible.

13. (b) The ash deposit of cardboard between the crucible and base block prevents sticking.

14. (b) & (c) Slag build-up on the bottom of the furnace not only reduces combustion space thereby prolonging heating, but also diverts the flame onto the crucible.

15. (b) A frozen heel expands on reheating causing the crucible to crack.

16. (c) Another reason for preheating the charge is to remove moisture.

17. (b) Using separate crucibles for each alloy will prevent metal contamination.

CASTING through the Ages

Booklet Tells How Machinery Creates Jobs and Opportunities

New booklet, "The Adventures of Countersunk J. Lathe or What the Machine Tool Is Doing to Civilization," points out that machines do not make people obsolete. Size is 5 x 7 in. and book contains 22 easy-to-read, well illustrated pages.

The story revolves around a character named Countersunk J. Lathe who lives in a very unprosperous little community. He invented something called a Widget which he hopes will improve the standard of living. Demand is immediate, but being made by hand, they are expensive, and production is slow. He of necessity is forced to invent another machine to produce more Widgets faster. Initial community disapproval, based on fear that the new machine will create unemployment, changes to amazement when reduced prices create so much demand that more people than ever are put to work. Booklet goes on to point out the parallel of this story in several of our large American industries.

For more information, sample copy and prices, write to: Enterprise Publications, 11 N. Wacker Drive, Chicago.

continued from page 89

8 . . Twin City

Covered Wagon, Minneapolis. D. L. Lavelle, American Smelting & Refining Co., South Plainfield, N. J., *"Aluminum Casting Defects and Their Correction."*

8 . . Northern Illinois-Southern Wisconsin

Hotel Faust, Rockford, Ill. Lester B. Knight, president, Lester B. Knight & Associates, *"Modernization of Foundries."*

8 . . Mid-South

Chisca Hotel, Memphis. Clyde A. Sanders, vice-president, American Colloid Co., *"Sand."*

9 . . Saginaw Valley

Fisher's Hotel, Frankenmuth, Mich. Ladies Night. Dr. Llewellyn Heard, research chemist, Standard Oil Co., *"Fire Magic."*

10 . . Northeastern Ohio

Tudor Arms Hotel, Cleveland. Pattern Makers Night.

11 . . Eastern Canada

"The pH Control in Molding Sand."

11 . . Southern California

Rodger Young Auditorium, Los Angeles. W. B. Bishop, Archer-Daniel-Midland Co., *"The "D" Process."*

11 . . Central New York

Onondaga Hotel, Syracuse. L. D. Richardson, national supervisor of sales and service, Eutectic Welding Alloys Corp.,

Show Career Opportunities at Carnival

Display designed by members of the AFS Michigan State College Student Chapter, part of the industry-wide cast metals exhibit planned by F. James McDonald, Saginaw Malleable Plant, General Motors Corp., Robert D. Dodge, Archer-Daniels-Midland, and Paul W. Olsen, Eaton Mfg. Co., of the M.S.C.—Foundry Educational Foundation Advisory Committee, for the 6th annual Career Carnival at Michigan State College. The Saginaw Malleable Plant provided a push-button illuminated multi-panel display of automotive ferrous castings.

TWIN CITY . . George T. Ball, left, president Northern Malleable Iron Co., St. Paul, and guest speaker at the November meeting accompanied by A. W. Johnson, chapter chairman, and assistant superintendent at Northern Malleable.

"New Developments in Foundry Welding."

14 . . Central Ohio
Seneca Hotel, Columbus. Students of Ohio State University Chapter, *"Investigations of Foundry Materials & Methods."*

14 . . Rochester
Rochester Chamber of Commerce. Joint Meeting with A.S.M. Dr. James B. Austin, vice-president, U. S. Steel Corp., *"Magnification in Time in Metallurgical Operations."*

14 . . Michiana
Oliver Hotel, South Bend, Ind. Non-Ferrous Div.: H. M. St. John, Crane Co., Chicago. *"Brass and Bronze Foundry Practice."* Ferrous Div.: T. E. Barlow, International Minerals & Chemical Corp., Chicago, *"High Pressure Molding."*

14 . . Timberline
Oxford Hotel, Denver. J. D. Robinson, assistant factory manager, Bendix Prod. Div., Bendix Aviation Co., *"Non-Ferrous Casting Techniques."*

16 . . Oregon
Columbia Athletic Club. Warner B. Bishop, Archer-Daniels-Midland Co., *"D Process."*

16 . . Central Michigan
Hart Hotel, Battle Creek. Richard Schneidewind, professor, Engineering College, University of Michigan, Ann Arbor, *"Uses of Injection Equipment in Melting Hypereutectoid Irons."*

17 . . Washington
Stewart Hotel, Seattle. Warner B. Bishop, Foundry Products Div., Archer-Daniels-Midland Co., "Common Sense in Cores."

17-18 . . Birmingham
Tutwiler Hotel, Birmingham, Ala. Birmingham Chapter will be host to Southeastern Conference.

18 . . Texas
Hotel Beaumont, Beaumont. Harry W. Dietert, H. W. Dietert Co., Detroit, *"Progress in "D" Process Molding."*

18 . . Tri-State
Tulsa. *"Non-Ferrous Foundry Practices."*

21 . . Quad City
J. S. Schumacher, Hill & Griffith Co., *"Fool-Proof Sand."*

25 . . Chesapeake
Engineers Club, Baltimore, Md. G. A. Pealer, Pattern Department, General Electric Co., Elmira, N. Y., *"Modern Pattern Practice and New Materials in the Foundry."*

25 . . Ontario
Royal York Hotel, Toronto. Past Chairmen's Night. R. Kijowski, Massey-Harris-Ferguson Ltd.; J. McConachie, William Kennedy & Sons; J. Morgan, Foundry Services (Canada) Ltd.; H.

Graham, William Kennedy & Sons; T. Hewitt, Canadian Westinghouse Co. Ltd., *"Irish Stew."*

March

1 . . Rochester
Hotel Seneca. David Stein, Samuel Greenfield Co., Inc., Buffalo, *"Melting and Fluxing of Non-Ferrous Metals."*

7 . . Central Illinois
American Legion Hall, Peoria. W. A. Hambley, Charles A. Krause Milling Co., *"Casting Defects."*

7 . . Central Indiana
Athenaeum, Indianapolis. H. F. Bishop, Naval Research Laboratory, *"Gating and Feeding."*

7 . . Chicago
Chicago Bar Association. Dr. Frank B. Rote, technical director, Albion Malleable, *"Blow-Squeeze Molding."*

7 . . Western Michigan
Fingers Restaurant, Grand Rapids. Zig Madacey, Beardsley & Piper Div., Pettibone-Mulliken Corp., *"Core Making and Core Blowing."*

8 . . Twin City
Covered Wagon, Minneapolis. Panel Discussion. Moderator: H. H. Blosjo, metallurgist, Minneapolis Electric Steel Castings Co. Panel: Nathan Levinsohn, foundry superintendent, Minneapolis Moline Co., *"Cast Iron Sands"*; Ed Anderson, sand technician, American Hoist & Derrick Co., *"Steel Sands"*; Carlton C. Hitchcock, vice president, R. C. Hitchcock and Sons, Inc., *"Non-Ferrous Sands."*

14 . . Central Ohio
Seneca Hotel, Columbus. Palmer Derby, Lynchburg Foundry Co., *"Shell Molding."*

14 . . Timberline
Oxford Hotel, Denver. R. H. Groman, Eutectic Welding & Alloys Corp., *"Foundry Welding & Reclamation."*

18 . . Texas
Western Hills Hotel, Fort Worth. Aubrey Grindle, president, Grindle Corp., Harvey, Ill., *"Trends in Cupola Design and Practice."*

A.W.S. Elects New Officers

Joseph H. Humberstone, Air Reduction Sales Co., Inc., New York, has been elected president of the American Welding Society. Also elected were J. J. Chyle, A. O. Smith Corp., Milwaukee, 1st vice-president and C. P. Sanders, United States Steel Co., 2nd vice-president.

Four directors-at-large have been elected. They are: E. D. Peters, Leader Iron Works, Decatur, Ill.; R. J. Yarrow, Consolidated Iron and Steel Mfg. Co., Cleveland; G. O. Hoglund, Alcoa Process Development Laboratories, New Kensington, Pa., and J. L. Wilson, Consulting Naval Architect and Engineer, New Jersey.

In addition, the following District Directors were elected: Southwest District, J. B. Davis; Central District, J. R. Stitt; New England District, H. H. Stahl; Midwest District, H. Jackson, and Western District, R. H. Smith.

Obituaries

Ray Hunter died of a cerebral hemorrhage in his home on November 17. Ray was the New England sales manager for Archer-Daniels-Midland Co., Cleveland.

Samuel W. Healy, production manager for General Metals Corp., Oakland, passed on December 3. Mr. Healy was employed by Saginaw Malleable Iron Div., General Motors Corp., in 1926 and was made a supervisor in 1932. In 1941 he was made works manager. In 1946 the Central Foundry Div. was organized, and Mr. Healy was made assistant to the general manager. He was in the employ of General Motors until five months ago when he joined General Metals Corp.

John J. McAntee died recently of a heart attack. Since 1950 he had been a manufacturers agent for various steel foundries. Before that he was employed by the Covel Manufacturing Co. for 33 years. Mr. McAntee was a past director of the Michiana Chapter of AFS.

William C. Frye, a director and former president of Chain Belt Co., died November 16. He had been associated with Chain Belt Co. for 60 years. In 1895 he joined the company as its first office boy and became president of the firm in 1916. Mr. Frye retired as president of Chain Belt in 1923 but continued as a member of its board of directors.

Duncan W. Fraser, for 14 years president of American Locomotive Co., passed away on December 20. He retired as chairman of the board early last year, after having served with American Locomotive Co. for 56 years.

Wilfred H. White, owner, Watertown Foundry Co., Watertown, S. Dak., died December 1. Mr. White began his career as a chemist with E. I. du Pont de Nemours, Buffalo. After three years there he joined Jamestown Malleable Iron Corp., Jamestown, N. Y. He did metallurgical work there until 1942 when he became chief of the Tungsten Section, Ferro-Alloys Branch, W.P.B., Washington. He served as a metallurgist for the Jackson Iron & Steel Co., Jackson, Ohio, from 1944 until he acquired the Watertown foundry last year.

Two Safety Films Available

National Safety Council announces two new safety films, "Take Time to Live" and "If You Took Your Family to Work."

"Take Time to Live" tells how one worker found a better way of life at a cost to himself of just five minutes a day. Many workers are stampeded into lost-time accidents by their alarm clocks. They fail by just a few minutes to allow themselves enough time for dressing, breakfast and getting to the job. And those few minutes spell the difference between a good way to live and a harried, unsafe schedule.

Involves a Typical Day on the Job

"If You Took Your Family to Work" demonstrates what would happen to a worker's attitude if his family actually came to the job with him. The film involves a worker and a typical day on the job. Imagining that his son is watching him, the responsibilties of personal safety are constantly brought to his mind, and he realizes that his safety is of concern not only to himself but also to those near and dear to him.

Films run 12 minutes each and are available in 16mm sound movies and 35mm sound slidefilms. For further information and prices write the National Safety Council, 425 N. Michigan Ave., Chicago 11, Ill.

Free Tear Sheets

of all AMERICAN FOUNDRYMAN articles are available on request. Keep your magazine intact and pass it on for others to use. For free tear sheets, write to Editor, AMERICAN FOUNDRYMAN, Golf & Wolf Roads, Des Plaines, Ill. Please show company connection and your title on tear sheet request.

At the Fall meeting of the Foundry Educational Foundation Industrial Advisory Committee of Pennsylvania State University, National Directors and Trustees of F.E.F. along with wives, faculty members, and 40 students in the foundry option, met at a banquet on the university's campus, pictured on the left. View on right shows two foundry option graduate students (left to right) Roger Yard and John Leaman, receiving scholarship certificates from C. D. Galloway III, Chambersburg Engineering Co., and Chairman of the F.E.F. Committee at Penn State.

Abstracts

Abstracts below have been prepared by Research Information Service of The John Crerar Library, 86 East Randolph Street, Chicago 1, Ill. For photoduplication of any of the complete articles briefed below, write to Photoduplication Service at the above address, identifying articles fully, and enclosing check for prepayment. Each article of seven pages or fraction thereof is $1.40, including postage. Articles over seven pages are an additional $1.40 for each seven pages. A substantial saving is offered by purchase of coupons in advance. For a brochure describing Crerar's library research service, write to Research Information Service.

A547 . . "Bimetallic Castings," Vincent Delport, *Foundry*, vol. 82, no. 9, Sept. 1954, pp. 102-105, 212, 214, 215. Described is a process allowing the desirable properties of cast iron and aluminum to be combined by casting aluminum against precoated cast iron.

A548 . . "Solving Problems in the Brass Foundry," Harold J. Roast, *Foundry*, vol. 82, no. 9, Sept. 1954, pp. 106-107, 222, and 224; and vol. 82, no. 10, Oct. 1954, pp. 130-131, 258, 259, and 260. The author lists and details 15 steps for solving the problem of leaky tin bronze castings. He concentrates on troubles encountered with pressure castings, melt quality, and heavy scrap charges.

A549 . . "Malleable Foundry Modernizes Facilities," Edwin Bremer, *Foundry*, vol. 82, no. 9, Sept. 1954, pp. 108-111, 274-276, and 278-280. Plant write-up,

continued on page 97

Three Regionals

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Southeastern Regional

The Tennessee, Birmingham District, and University of Alabama Student Chapters of AFS are sponsoring the 23rd Annual Southeastern Regional Foundry Conference at the Tutwiler Hotel, Birmingham, Ala., February 17 and 18. Conference chairman is E. E. Pollard, Caldwell Foundry & Machine Co., Birmingham. A ladies program, under the chairmanship of Mrs. L. N. Shannon, is included in the program for the first time in the history of this regional. Program Chairman Albert J. Fruchtl, U. S. Pipe & Foundry Co., Birmingham, has arranged the following:

THURSDAY, FEBRUARY 17

9:00 am . . REGISTRATION

10:00 am . . *"New Molding Practices and Flask Design,"* William G. Reichert, Automatic Foundry Equipment, Reichert, Inc., Newark, N.J.

11:00 am . . *"Foundry Costs and their Meaning to Foundry Supervision,"* Wally E. George, George & Dix, Grand Rapids, Mich.

12:30 pm . . LUNCHEON.

2:15 pm . . *"Non-Destructive Testing and Inspection,"* John Anspach, Meehanite Metal Corp., New Rochelle, N. Y.

3:15 pm . . *"Safety, Hygiene, and Air Pollution,"* William N. Davis, AFS Safety, Hygiene & Air Pollution Control Director.

4:15 pm . . *"Shell Molding,"* Palmer Derby, Lynchburg Foundry Co., Lynchburg, Va.

FRIDAY, FEBRUARY 18

9:00 am . . PLANT VISITATIONS.

1:30 pm . . *"Preventive Maintenance,"* B. Y. Cooper, U. S. Pipe & Foundry Co., Birmingham.

2:30 pm . . *"Mechanization and Material Handling,"* Lester B. Knight, Lester B. Knight Associates, Chicago.

3:30 pm . . Sectional Meetings: *"Melting."*
Ferrous . . Wesley J. Estes, U. S. Pipe & Foundry Co., Birmingham.
Non-Ferrous . . Robert A. Colton, Federated Metals Div., American Smelting & Refining Co., Barber, N. J.
Steel . . to be arranged.

California Regional

The California Regional Foundry Conference, sponsored by the Northern California and Southern California AFS Chapters, will be held at the Huntington Hotel, Pasadena, Calif., March 25 and 26. The conference will treat ferrous and non-ferrous interests simultaneously with two papers each, on iron, steel, bronze, and aluminum foundry practices. In addition there will be two sessions of general interest to all foundrymen. Also scheduled is a program for the ladies.

Conference general chairman is William C. Baud, Mechanical Foundries Div., Food Machinery Co., Los Angeles. Advance registration can be made with Mr. Baud by writing to Box 58361, Vernon Branch, Los Angeles 58. Hotel accommodations can be arranged at the Huntington by writing to Bruce Farrow, Housing Chairman, Barker Foundry Supply Co., 2428 East 52nd St., Los Angeles 58.

Technical Chairman is Otto H. Rosentreter, Engineered Industrial Equipment, South Gate, Calif. He has set up the following program:

FRIDAY, MARCH 25

9:00 am . . REGISTRATION.

11:30 am . . LUNCHEON.

1:00 pm . . SECTIONAL MEETINGS.
Iron . . *"Modern Methods in Today's Iron Foundry: Molding, Melting, Pouring, Metallurgy,"* Harry H. Kessler, Sorbo-Mat Process Engineers, St. Louis.
Bronze . . Donald L. LaVelle, Federated Metals Div., American Smelting & Refining Co., South Plainfield, N. J.

3:00 pm . . SECTIONAL MEETINGS.
Steel . . *"pH Factor—What it is—How It Affects Castings—How to Control It,"* V. E. Zang, Unitcast Corp., Toledo, Ohio.
Aluminum . . *"Production of Aluminum Alloy Specification Castings,"* Roy E. Paine, Aluminum Co. of America, Los Angeles, and Dr. P. V. Faragher, Alcoa, Pittsburgh, Pa.

6:00 pm . . FELLOWSHIP HOUR.

7:00 pm . . DINNER.

8:30 pm . . *"New Developments in Foundry Welding,"* Jonathan Marden, Eutectic Welding Alloys Corp., New York.

SATURDAY, MARCH 26

10:00 am . . SECTIONAL MEETINGS.
Steel . . *"Making Steel Castings with Reclaimed Sand,"* William D. Emmett, Los Angeles Steel Casting Co., Los Angeles.
Aluminum . . to be arranged.

12:00 noon . . LUNCHEON.

1:30 pm . . SECTIONAL MEETINGS.
Iron . . to be arranged.
Bronze . . to be arranged.

3:00 pm . . GATING AND RISERING.
"The Use of Exothermic Materials as an Aid in the Gating and Risering of Steel, Iron, and Non-Ferrous Castings." Michael Bock, II, Exomet Inc., Conneaut, Ohio.

5:00 pm . . FELLOWSHIP HOUR.

Free Tear Sheets

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pictures, and layout of the extensive step-by-step modernization of the Marion Malleable Iron Works.

A550 . . "Spectrographic Analysis of Foundry Metal," Leslie E. Harper, *Foundry*, vol. 82. no. 9, Sept. 1954, pp. 112-113. The use of a direct reading spectrograph at Campbell, Wyant & Cannon Foundry Co. to obtain analysis within five minutes of cast steel and gray and alloyed cast irons.

A551 . . "Notch Ductility of Nodular Irons," G. A. Sandoz, H. F. Bishop, W. S. Pellini, *Foundry*, vol. 82, no. 9, Sept. 1954, pp. 114-119, 263-266. Ductile metals usually fail from notch conditions such as threads, keyways, grinding or quench cracks, shrinkage, or weld flaws. The drop weight test described is a simple method of determining resistance to notch failure.

A552 . . "Design and Dimensional Control for Investment Castings," R. L. Wood, *Foundry*, vol. 82, no. 9, Sept. 1954, pp. 120-121, 225, 228-229. Investment casting to close tolerances depends on variables of materials and casting design. Design hints are offered which promote closer tolerances.

A553 . . "A Plan for Productive Maintenance," Jack C. Miske, *Foundry*, vol. 82, no. 9, Sept. 1954, pp. 122-123, 268, 270-272. Program of preventive maintenance proposed by the Apparatus Sales Div., General Electric Co., pays its own way through lower product cost due to the increased productivity of longer-lived machinery.

A554 . . "Fitting the Foundry Worker to his Job," Phil Hirsch, *Foundry*, vol. 82, no. 9, Sept. 1954, pp. 124-125, 240-242. A description of the job-placement medical examination program of American Brake Shoe Co. which has cut the accident injury frequency rate over one third and has cut the severity rate in two.

A555 . . "How Melting Practice Affects Machinability of Malleable Iron," E. A. Loria, *Iron Age*, vol. 174, no. 12, Sept. 16, 1954, pp. 168-170. A comparison of the effects of diluting with steel and decarburizing with a CO_2 atmosphere on the machinability of malleable iron.

A556 . . "Better Permanent Mold Techniques Improve Casting Quality," H. E. Zahn, *Iron Age*, vol. 174, no. 12, Sept. 16, 1954, pp. 174-175. How Gould-National Batteries, Inc. was able to produce longer-lived lead battery grids through redesign and control of improved permanent molding techniques.

A557 . . "Acceptance Standards for Magnetic Inspection Improve Quality, Lower Rejection Rates on Critical Parts," Stephen Maszy, *Iron Age*, vol. 174, no. 13, Sept. 23, 1954, pp. 114-115. Use of isometric drawings of each steel part has allowed Convair Div., General Dynamics Corp., to determine whether inclusions present in a part will be harmful.

A558 . . "Close Tolerance Castings," Malcolm W. Riley, *Materials & Methods*, vol. 40, no. 3, Sept., 1954, pp. 121-136. Manual of the materials, methods, and design factors of investment, plaster, permanent mold, die, shell mold, and special sand casting processes. Advantages and limitations of each process are presented.

A559 . . "Linings for Induction Furnaces," H. E. White, *Metal Progress*, vol. 66, no. 3, Sept. 1954, pp. 99-106. Materials and procedures for lining induction furnaces too large for the economical use of crucibles.

A560 . . "Induction Surface Hardening of Ductile Iron," Joseph F. Libsch and Joseph C. Danko, *Metal Progress*, vol. 66, no. 3, Sept. 1954, pp. 115-121. Procedures for obtaining the unique combination of a wide variety of core properties with case hardening to controllable depths.

1954 AMERICAN FOUNDRYMAN INDEX

Subject and Author Index for volumes 25 and 26 (1954) of AMERICAN FOUNDRYMAN is available gratis on request. Ask for "1954 Index;" write to AMERICAN FOUNDRYMAN, Golf and Wolf Roads, Des Plaines, Ill.

Advertisers and their Agencies

Here's How Lindgren Foundry Co., Batavia, Ill., uses the Round Hydra fly ash and spark suppressor as part of its air pollution control program. All surfaces within the Round Hydra are continuously washed allowing no material to collect then landslide into drains. This continuous washing allows material to be moved rapidly and fluently to disposal through large piping. The unit not only washes the gases with a water curtain, but also scrubs the gases with steam. This is accomplished by water supply pipes being connected directly to the lower periphery of the conical deflector water jacket plate. The water flows upwards through the water cavity and out through the opening in the top plate at the apex of the cone, and down over the top plate of the water jacket. The water flowing off the lower edge of the top plate forms an effective curtain for the removal of smoke and solids from the cupola gases. As the water flows over the top plate, which is heated by the hot gases, it becomes vaporized and builds up a halo of steam under the circular plate around the top of the collector. This "Halo of steam and vapor" captures the finest particles and returns them to the gutter. *C. C. Hermann Arrestors.*

This index is published as a convenience to the readers. While every care is taken to make it accurate AMERICAN FOUNDRYMAN assumes no responsibility for errors or omissions.

FOUNDRY TRICKS AND LIMERICKS

An old ladle-liner called Dew
Turned himself into a sprue,
While pouring hot steel
He entangled his heel,
Fell into the gate and slipped through.

A coremaker gave out a howl,
Turned to his boss with a scowl,
And said to him, "Bob,
I'm so tired of this job
That I'm ready to throw in the trowel."

Molder working hell-bent-for-election,
Broken air hose flew in his direction.
When he woke up in bed
A week later, he said,
"That's one time I got the connection!"

When a dry-floor man walked into a bar
And handed each guy a cigar
And they said, "Congrats, Roy,
A girl or a boy?"
He said, "Neither. I've got a new car."

A black-headed craneman called Louie
Turned around when his fuses went blooie,
Stuck his finger in, then
Pulled it right out again.
Sometimes I believe the guy's screwy!

The oiler who greases the cranes
Is not over-gifted with brains,
Puts a gallon of oil
On the motor and coil,
And smears axle grease on the chains.

Pattern girl says, "I've nothing to do,
So I'M going to quit at two-two".
Said her partner, "My dear,
It's dull around here,
So I'm quitting at two-two too."

From Rammed Up and Poured, book of foundry poems by Bill Walkins, obtainable from the copyright owners: Electric Steel Foundry Co., 2141 North West 25th Ave., Portland 10, Oregon. Price, $1.85.

New Employee Magazine

New business magazine, "Enterprise," is now available for office and factory employees. An eight-page 8½ x 11 in. periodical, it is published monthly in Chicago by Enterprise Publications.

The book's prime aim is to simplify and explain the basic elements of business which generally mystify the average employee. The magazine is purchased in quantity by business firms and distributed to employees through information racks, by mail, or as a supplement to employee publications.

Regularly featured, are articles on such subjects as buying a house, evaluating real estate, getting along with others in shop and office, and home-making hints for the women in the family.

For prices and full information, write to Enterprise Publications, 11 N. Wacker Drive, Chicago.

Classified Advertising

Boosts output from 1600 to 4500 cores per shift

Estimated savings: $10,000 yearly

Earl N. Steel (left), Foundry Superintendent and George Forkey, Core Room Foreman, are pleased with the results.

Loading end of THERMEX Core Baker. Conveyor extends 20 ft. to allow core makers to load from their stations.

ACCORDING to Mr. F. V. Cowing, Vice President in Charge of Production, Repcal Brass Manufacturing Company, Los Angeles, replacement of conventional ovens with a THERMEX* Core Baker has given these results in the manufacture of their plumbing brass goods:

LOWER COSTS. Now produces more cores with *one* shift than formerly with *two* shifts. Ratio of helpers to core makers being cut from 3:1 to 1½:1. Estimated yearly savings: $10,000.

CONTINUOUS FLOW. Fast turnover of core plates enables them to produce 4500 cores continuously per shift with only 35 wood waste driers; where 400 driers were formerly required for 1600 cores per shift.

BETTER QUALITY. Smooth surfaces and perfectly uniform dimensions are obtained, core after core, day after day.

IMPROVED WORKING CONDITIONS. Cooler. No smoke.

Find out how *you* can get startling savings and quality improvements with THERMEX Core Baking Equipment. Call or write The Girdler Company, Thermex Division, Louisville 1, Kentucky.

*THERMEX—Trade Mark Reg. U. S. Pat. Off.

The GIRDLER Company

A DIVISION OF NATIONAL CYLINDER GAS COMPANY

THERMEX DIVISION

For more data, circle No. 958 on postage-free Reader Service card on p. 17 or 18